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for the IBM Personal Computer

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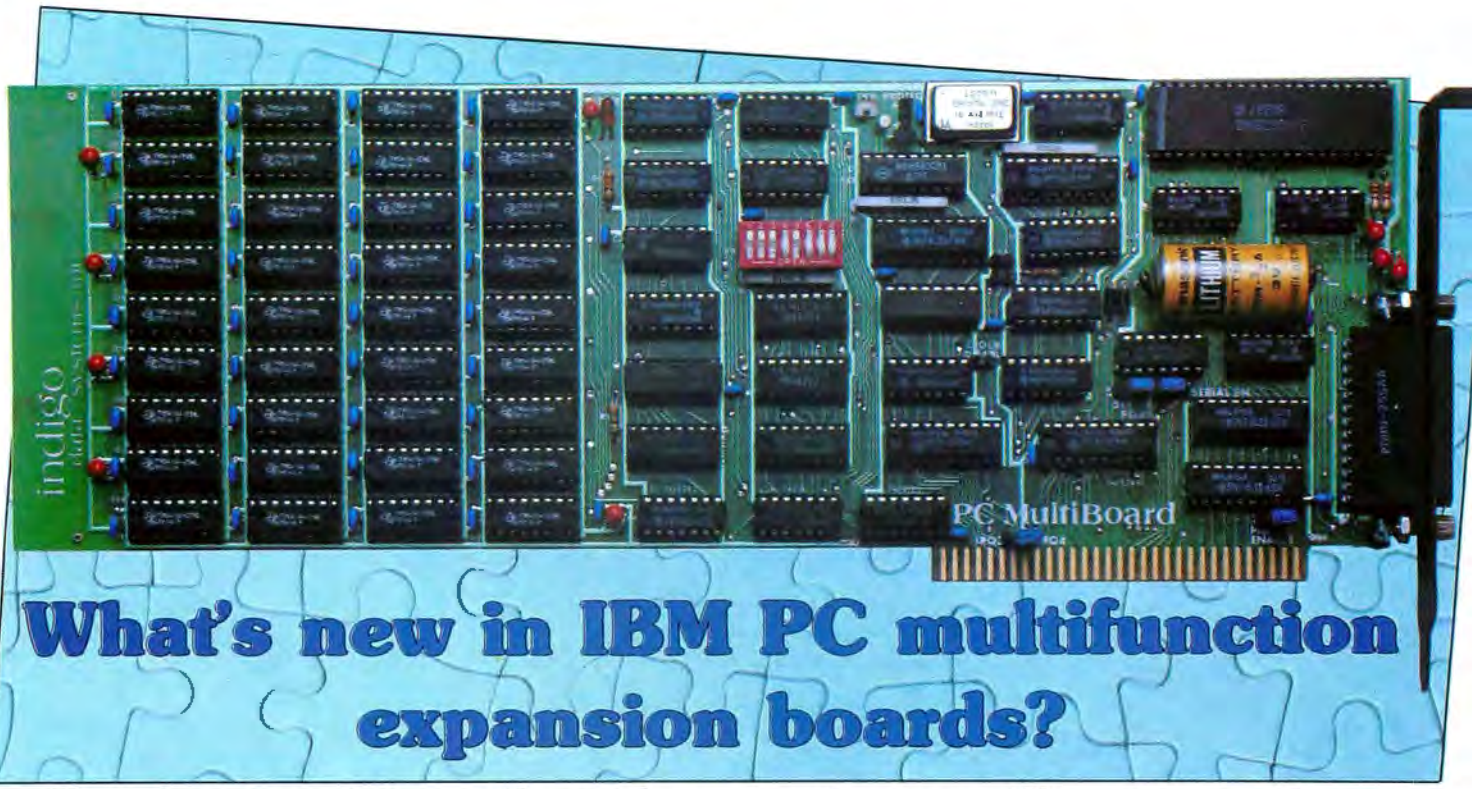

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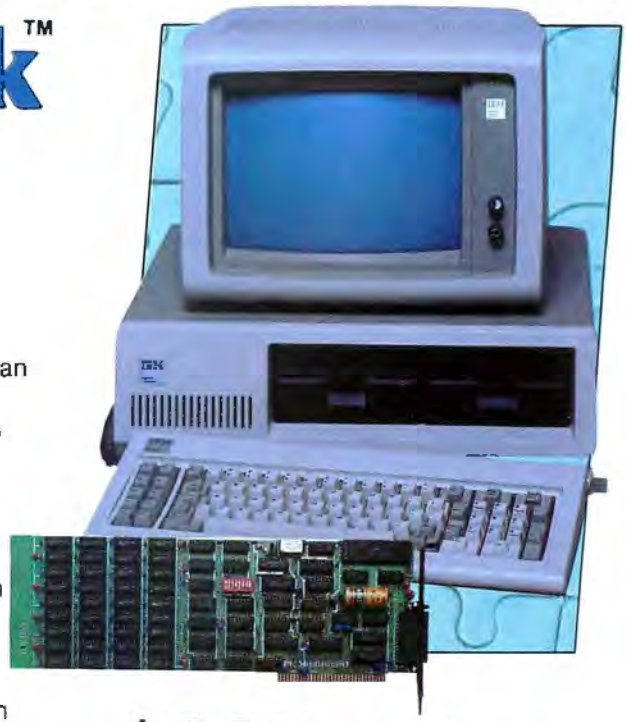

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President, International Datawares, Inc.

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CONTEST

This month's contest is simple. Send us your list of sixteen things you can do with a dead computer. Best overall list wins $100 in software. Funniest single item gets $50. No warmed-over cat jokes, please.

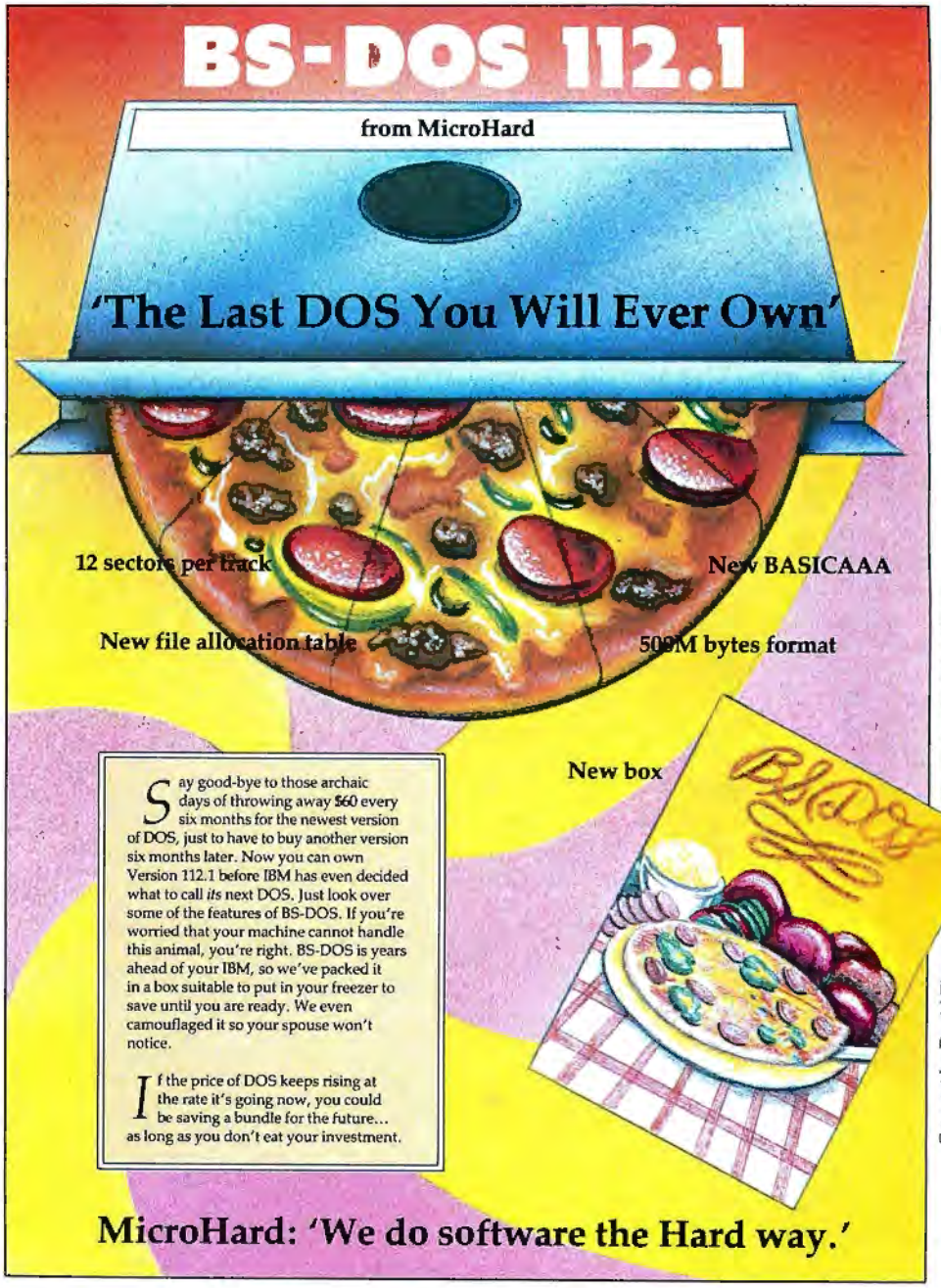
Send your entry—along with your name, address, phone, name of nearest dealer, and what of our advertisers' wares you want if you win—to Hello Kitty, Softalk/IBM, Box 60, North Hollywood, CA 91603. Deadline is January 15, 1984.

WINNERS

Winners of the last three contests will have extra stuffings for their stockings.

Sixteen-year-old David Ting (Colesville, MD), creator of the fictitious BS-DOS 112.1, has $100 worth of goodies coming to him. His prize package was our top choice in the July design-a-software-package contest.

The winner of September's "world's most challenging" crossword puzzle is Rosemary Szyplik (Ontario, CA). She also gets one hundred big ones. *(More winners on page 9.)*



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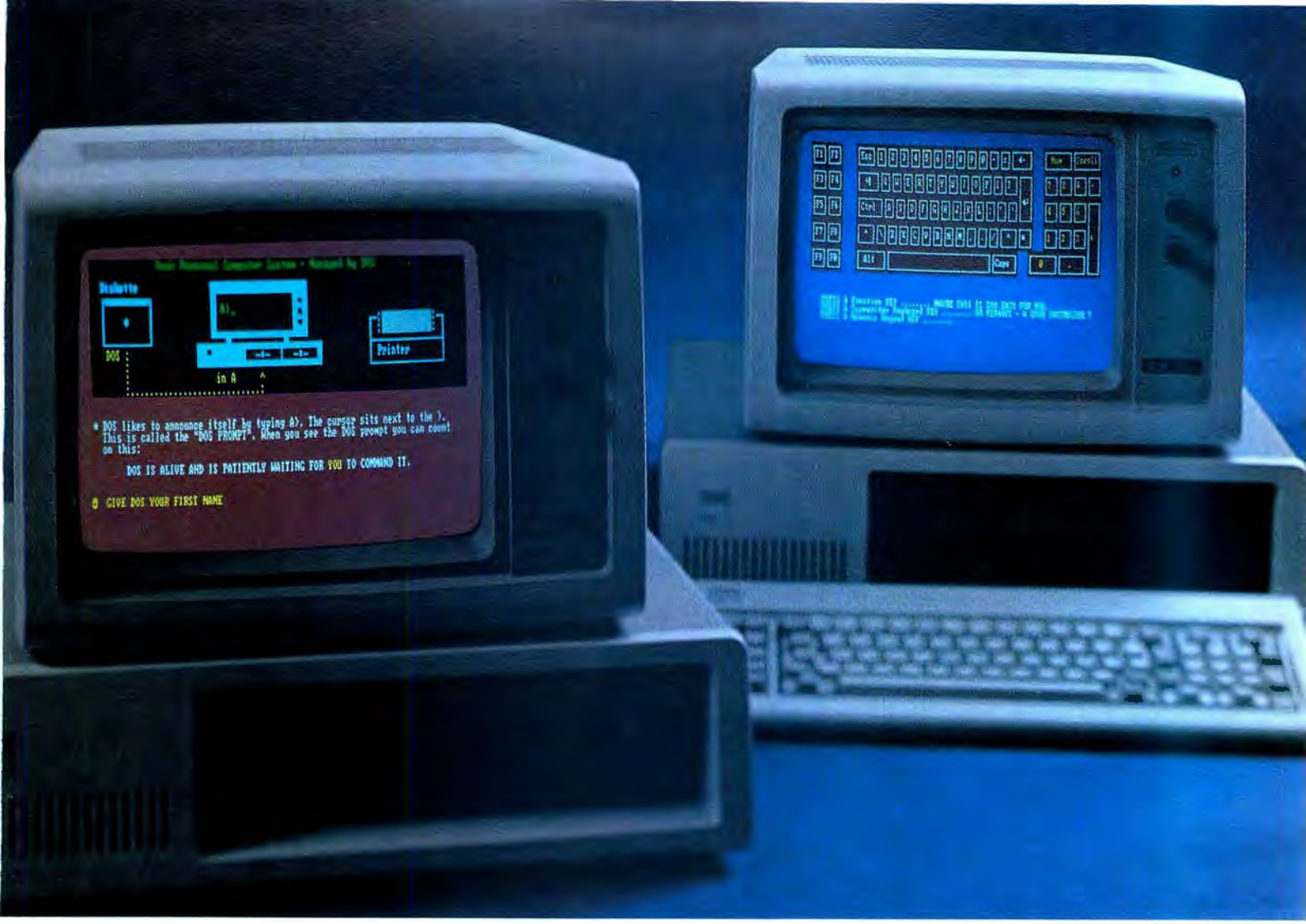

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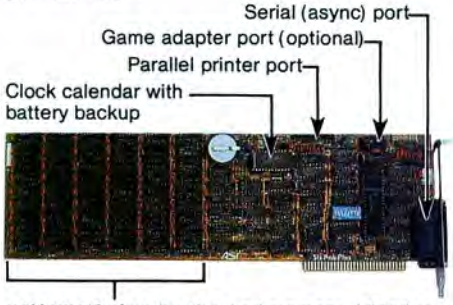

64K-384K of parity checked memory. Added to a PC or XT with a fully populated 256K system board, the SixPakPlus can bring the system memory to 640K, the maximum addressable user memory.

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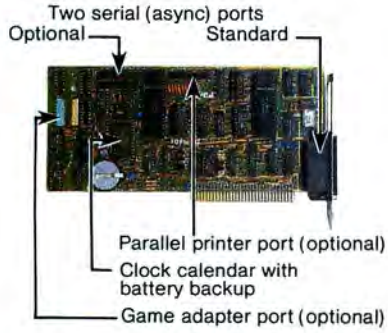

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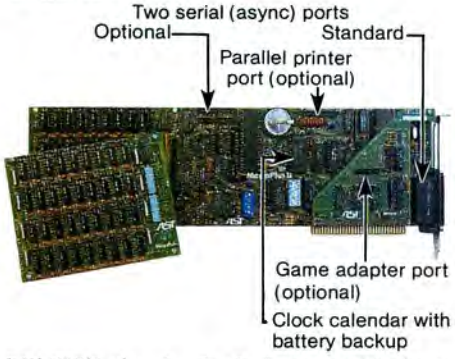

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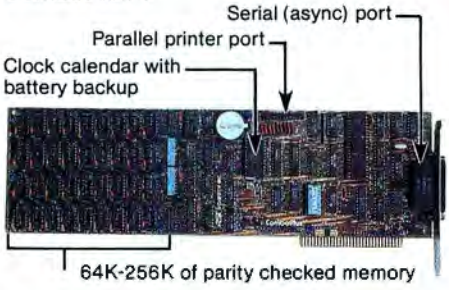

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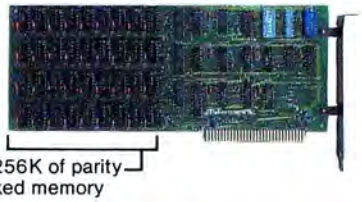

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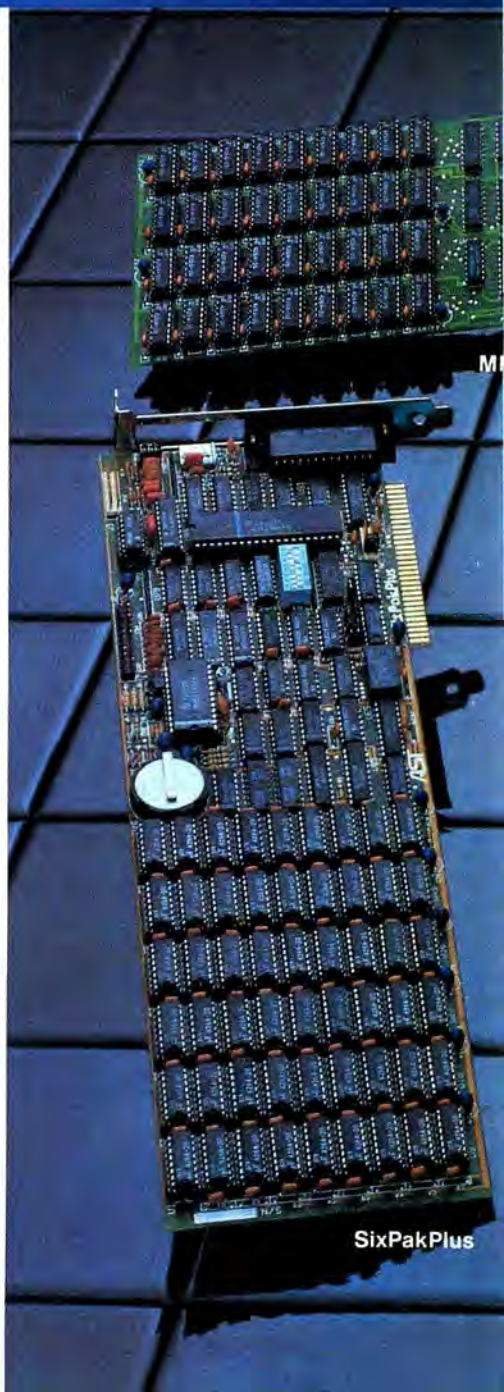

User Memory from 64K-512K — When added to your existing system memory, brings your PC up to its maximum of 640K. You can run larger spreadsheets or create larger in-memory databases. You can also use the additional memory along with the supplied AST SuperPak™ software which includes SuperDrive™ and SuperSpool™.

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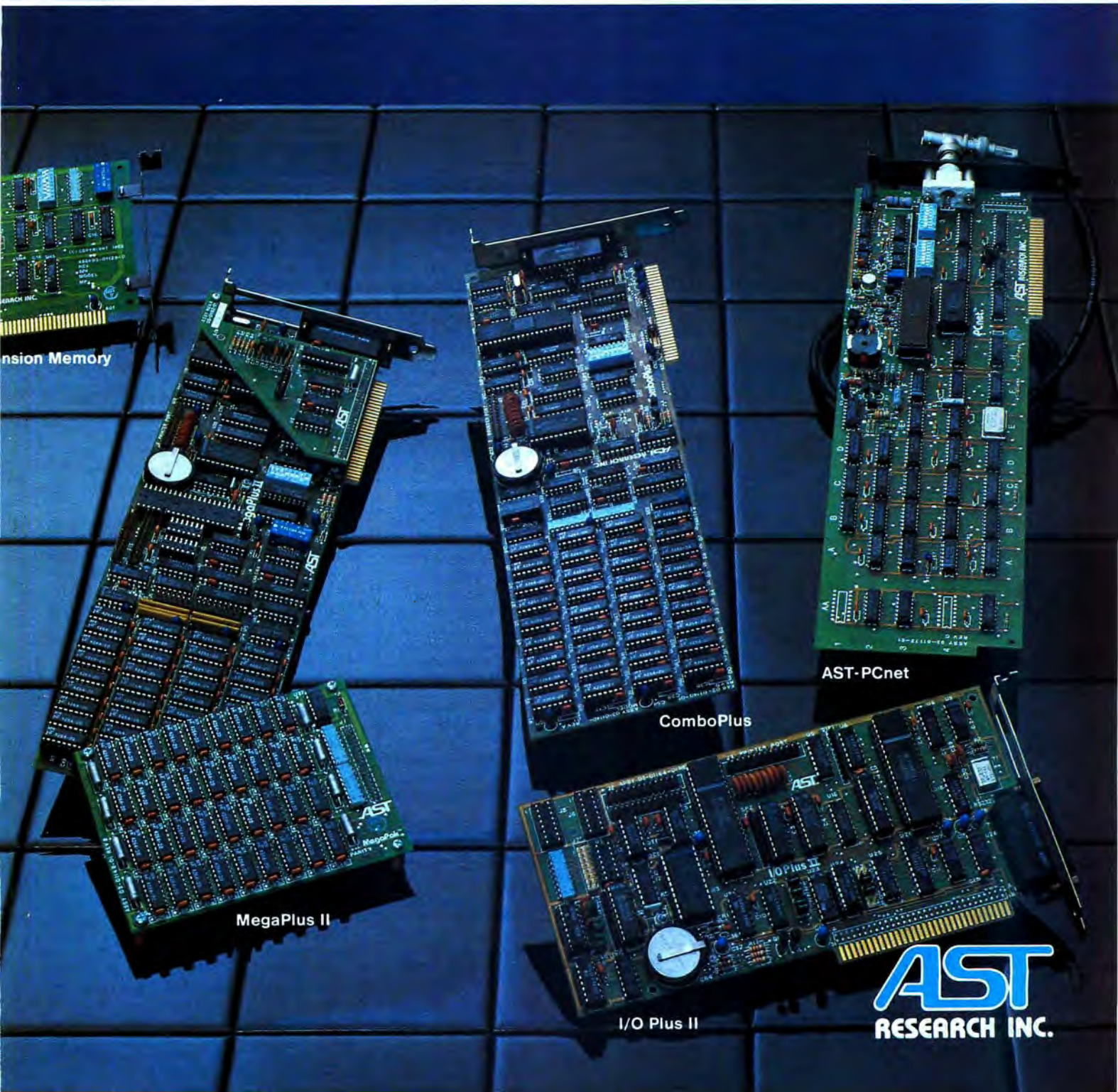

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```
10 screen 1: key off: cls: color 4,1
20 for X = 5 to 100
30 circle (160,100),215,rnd*2+1,,,5/X
40 circle (160,100),215,rnd*2+1,,,X,5:next
```

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MORE WINNERS

The August one-line-program contest almost put us under. We got so many entries we decided to categorize them in order to choose a winner. We selected the best program in each of four categories (graphics, humor, games, and "serious"), and then picked the grand prize winner from these four.

In the graphics category, we saw a lot of dazzling abstracts. The most hypnotic one-liner came from Dr. Charles Gaston, of Poughkeepsie, NY:

```
1 SCREEN 1,0:KEY
OFF:CLS:RANDOMIZE:CLS:Z=37:WHILE
Z:C=INT(RND*4):FOR I=1 TO 6:SOUND
200+4ND*1000,9:LINE-
(RND*319,RND*199),C:SOUND
Z,0:NEXT:Q=(Q+5+Z*RND) MOD
Z:SOUND Z+Q,200:PAINT
(RND*319,RND*199),INT(RND*4),
C:SOUND Z,0:J=J+RND/Z:COLOR ,
J MOD 2:WEND:END
```

The entry we liked in the humor category came from Richard Waikel (Fort Wayne, IN). If you know your ASCII, the listing explains itself:

```
1 CLS:FOR X=1 TO 184:PRINT " Our Data
";:NEXT X:FOR X=1 TO
1838:Y=1+INT(X/80):LOCATE Y,(X MOD
80)+1:PRINT " "+CHR$(2);:LOCATE
Y,80:PRINT " ";:WHILE
VAL(MID$(TIME$,8,1))=0:WEND:NEXT
X:LOCATE 12,16:PRINT "A little round
yellow man just ate ALL Our Data!"
```

We got a lot of games, including a three-part role-playing game in three lines. A find-the-ship-in-the-grid opus from Andrew Marc Greene (Jamaica Estates, NY) was chosen winner:

```
0 RANDOMIZE:N=INT(RND*21):E=INT
(RND*21):WHILE (N<>G OR E<>H) AND
N>-1 AND N<21 AND E>-1 AND
E<21:N=N-INT(RND*3-1)*(N<>G):E=E-
INT(RND*3-1)*(E<>H):INPUT G,H:PRINT
MID$("N S",SGN(G-N)+2,1)MID$("E
W",SGN(H-E)+2,1):WEND:PRINT
MID$("LW",(N=G)*(E=H)+1,1)
```

Here are Greene's instructions:

An enemy ship is hiding in a 20-by-20 area. Your mission is to find and destroy that ship before it escapes. The north-south and east-west axes are numbered from 0 to 20 northward and eastward; the 0,0 coordinate is in the lower left corner of the grid.

On each turn, you shoot a location given by north and east coordinates. The computer calculates damage to the enemy ship, according to the following table:

North	*East*	*Damage*
Wrong	*Wrong*	*None*
Wrong	*Right*	*Ship can move only north/south on next turn.*
Right	*Wrong*	*Ship can move only east/west on next turn.*
Right	*Right*	*Ship is destroyed; you win.*

After each shot you get a short intelligence report telling you the position of the enemy relative to your shot. Then the enemy ship either moves in one of the eight basic directions—N, NW, W, SW, S, SE, E, and NE—or it stands still. After it moves, you get another chance to shoot.

If the enemy sneaks out of the area, you lose. The computer will add an L to its intelligence report, informing you of your demotion. If you blow up the ship, the computer skips a line and says W. Basic's prompt means the game is over.

In the serious vein, Dave Parker (Saratoga, CA) submitted an "honest-to-goodness, full-function" word processor:

```
1 J$=SPACE$(40):DEF
SEG=&HB000PRINT STRING$(-
N=0),12):N=1:LINE INPUT M$:IF
M$="save" THEN INPUT "Name
→";F$:LOCATE CSRLIN-2:PRINT J$:PRINT
J$:BSAVE F$+".WP",0,&H1000RUN ELSE
IF M$="load" THEN INPUT "Name
→";F$:BLOAD F$+".WP",0:GOTO 1 ELSE 1
```

Parker's instructions:

As is, the program works with the graphics adapter. Change &hb800 *to* &hb000 *for monochrome.*

In Basic, in eighty-column text mode, preferably with the key display off, type run *to start. To create a new file, simply start typing and editing on the blank screen. To save your text, get to the beginning of a new line and type* save *(no capital letters). The computer will prompt for a filename. Enter an eight-character root name; an extension of .WP will be added, the file will be saved, and the program will restart. To load an old file made by this program, type* load *on a new line and enter the file's root name at the prompt. To print a file, press shift-printscreen with the text on-screen.*

And the Winner Is. . .

In the judges' humble opinions, the big $100 winner is Dr. Gaston, for his angular abstract.

Congratulations to David, Charles, and Rosemary; our thanks to the one-liner runners-up and all the other one-line programmers. ▲

crosstalk

Tommy.bas

In the October 1983 "Crosstalk" there was a description of the program Tommy.bas. For some reason I was not able to find the part of the program that came after line 140. Would you please send me a copy of the entire listing?

Rona Lambing, Willmar, MN

For those who wrote or called in about Tommy.bas (or were just wondering about it), the program is all there, but the references in the letter were incorrect. It runs as printed.

Help for the Handicapped

In recent months many magazines devoted to personal computers have printed letters from handicapped persons struggling with keyboards. Our problem (I myself am disabled) is that we can only press one key at a time because of our physical limitations. Any multikey combination, such as control-break, is impossible.

A solution to this problem is now available to pc users. RoseSoft has produced a special version of their keyboard enhancer, *ProKey*, which "remembers" the control, alt, and cap shift keys until after the subsequent (nonshift) key is struck. Thus, any multikey combination can be expressed as a sequential series of single keystrokes.

ProKey provides an elegant solution to a problem that has plagued disabled computer users for years. It can be obtained from RoseSoft, Box 45808, Seattle, WA 98105.

Mike Falconer, Madison, WI

A Bigger, Better BSCBAS

The BSCBas program presented in the November issue can be changed slightly to increase its utility, particularly for users who like to keep commonly used routines as completed .bas files using preassigned large line numbers. These files are then merged into a program under development or into an existing program that is being modified but for which no .bsc source file exists.

Change line 270 of BSCBas.bas from

```
270 LINECTR = 10
```

to

```
270 INPUT "Starting line number: " ;
    LINECTR
```

This is one more question (*the third*) for the user to answer, but it adds some utility that the published version did not have. Incidentally, if references are included in a .bsc source file to absolute line numbers, the BSCBas process leaves them alone and does not treat them as names. For example, *gosub 60000* will remain unchanged in the output .bas file. This allows convenient (but dangerous and hard-to-document) reference to preprocessed routines that will later be merged into the run-time .bas file.

Mark Gardner, Glendale, CA

Port of Los Angeles

Can readers who have used or developed purchasing software for the IBM Personal Computer tell us about their experiences? They'd be giving all of us a big help, especially first-time pc users. We wonder what pitfalls, obstacles, and barriers others have succeeded in overcoming. We in the Offices of the Purchasing Officer for the Port of Los Angeles got our *WordStar* to print only after having a glitch modified so it would work on our particular printer (the NEC Spinwriter 7710). We also have *dBase II*.

J. K. Drummond
Purchasing Administrative Assistant
Port of Los Angeles

Beginning Address of Basic's Data Segment

In the September 1983 issue of *Softalk* there was an answer given in "Questions and Answers" describing a method to determine the value for the beginning address of Basic's data segment. A short machine-language routine was called from Basic and the value for Basic's data segment (DS) was returned via a variable labled I%.

While this method will work, there is a potential pitfall with monochrome monitors. The memory location used to store the machine language was B000 hex. This is the screen buffer location for monochrome displays. If the program described is run on a monochrome screen, the even bytes of the machine language code (bytes 0, 2, 4, 6, 8, 10, 12, and 14, which in the code given are hex values 55, E5, 76, 50, D8, 04, 5D, and 02) will be written to the screen, while the odd bytes will attempt to set the attribute byte for each even location (two bytes determine each screen location; the first byte is the character and the second is the attribute).

The attribute byte determines whether the foreground and background are black or white, blinking or not, reverse video or underline. The characters in the code that are written will be undecipherable ASCII characters, with some characters blinking. The code will be written on the first line occupying the first eight character positions. This is a dangerous place to store data if a print to this location or a screen scroll occurs between the time the code

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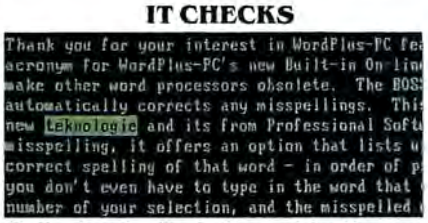

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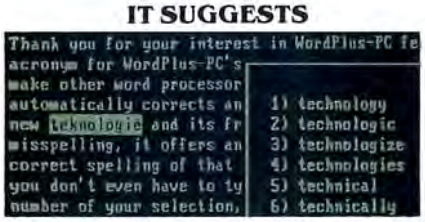
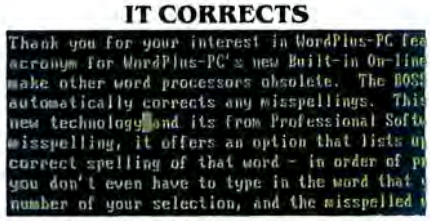


When a word is misspelled, the user can ask The "BOSS" for suggestions as to how to correctly spell the word. With only one keystroke, The "BOSS" will display, in a dynamic on-screen window, up to eight *spelling suggestions in the order of probable phonetic correctness.*

IT CORRECTS



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is written and time the routine is called. A print command will overwrite the code and a scroll command will erase it.

Fortunately, there is another and simpler method to determine Basic's data segment. On page 3-22 of the *Technical Reference* manual, it is stated that Basic's segment address is stored in absolute memory location 510 and 511. The following one-line Basic statement will print this value:

```
10 DEF SEG = 0 : J% = 256 * PEEK(&H511)
   + PEEK(&H510) : PRINT HEX$(J%)
```

This is the same value returned by I% in "Questions and Answers." The *def seg = 0* is to get to absolute memory 0, and the arithmetic converts hex numbers to decimal.

John J. Byrne, New Canaan, CT

Rounding Bug

Bernard Robinson's "How to Get 'Round the Rounding Bug" (August 1983) is a case of the cure being worse than the disease. I'm referring to the defined function FnErnd, which is introduced on page 96.

When the most significant digit to be rounded off is exactly five, FnErnd behaves as advertised: It rounds the preceding digit, if odd, up to the next even digit; otherwise it truncates. The problem arises when the number to be rounded already has the desired number of decimal places.

Example: Divide 100 by 8 and ask FnErnd to round the result to one decimal place; you'll get back 12.6. Or square 3.5 and round to two decimals and you'll get 12.26. In general, if you ask FnErnd to round to K places a number that already has exactly K places, it will always increment the final significant digit when the last digit is odd.

The algorithm is well suited to pocket calculators because no one in his or her right mind would round a two-place number to two decimals. The computer, of course, will blithely go ahead and do so, thereby creating the most insidious bug of them all—the kind that looks plausible.

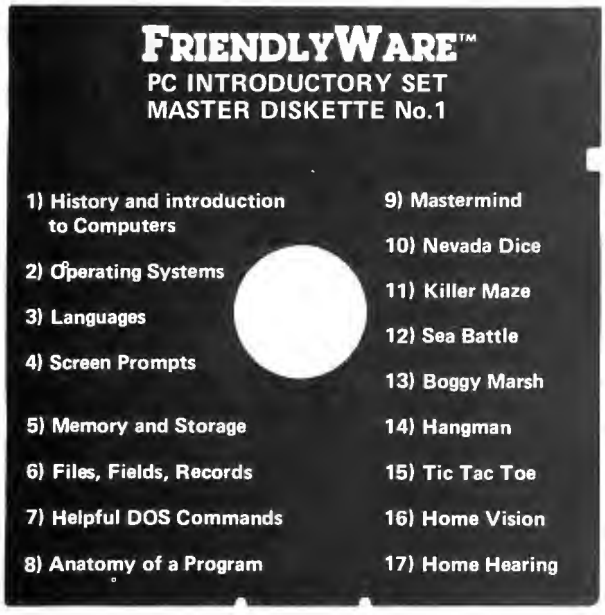
How about it, guys? A little more care, please?

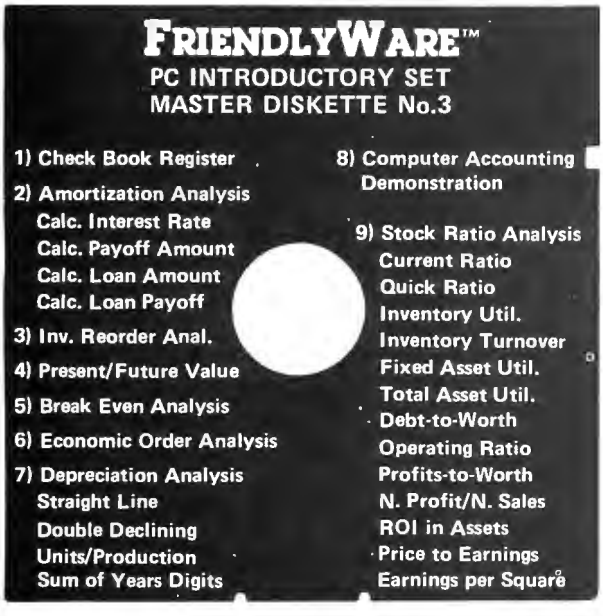
John van Laer, New York, NY

Good Screen, No Dump

I am writing about "From Screen to Dump in Almost 60 Flat" (July 1983). I have entered the subroutine and the graphics image program. I've also checked to make sure there are no errors and have run both the subroutine and the program.

The graphics image is, to say the least, impressive, but when it is done the printer doesn't print it. I have a pc, a color/graphics card, and an Epson MX-80 with Graftrax-Plus. The Basic subroutine is saved under the name HRSD and when run saves the subroutine under





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Dumpscrn. When the time comes to run the subroutine, the disk is accessed but the access is not terminated. It contiuually runs the drive. Control-break does nothing to stop this. Could you please help me solve my problem? I am anxious to use this screen dump.

Jeff Elder, Ames, IA

People with less than 96K must make the following changes to the programs to call the Dumpscrn machine-language subroutine. This command should be given when the DOS prompt appears on the screen:

A) BASICA /M : &H8000

This command reserves a 4K area of space for the machine language subroutine.

A warning IBM publishes in the Basic manual is that bload *does not perform an address-range check. Since the* bload *command was trying to load the memory-image file outside the available memory range, the command could never be completed and the disk drive ran continually. The* def seg *in line 20 and the* bload *in line 30 should be changed for the machine language program to be loaded correctly and executed in machines with less than 96K.*

Below is the complete Fastdraw program.

```
10 SCREEN 2,0,0          ' hi-res graphics
11 DEF SEG =             ' addrs of graphics
   &HB800                  buffer
12 BLOAD                 ' load hi-res picture
   "PICTURE"
20 DEF SEG =             ' decimal location
   &HFE0                   65024
30 BLOAD                 ' load machine lang.
   "DUMPSCRN",0            prog.
40 WIDTH                 ' set printer width
   "LPT1:",255
60 SUBRT% = 0
70 CALL SUBRT%
80 END
```

Christopher J. Lindell, Coralville, IA

Sony Profeel Monitor

I read with great interest the letter from Dr. Malladi Subbaiah (August 1983) regarding problems connecting a Sony Profeel monitor to his pc. I just connected a Sony Monitor KX-1211HG to my pc without any problems. Some of your readers may not realize that Sony has an RGB interface for the pc.

The Sony monitor and interface require no special wiring. The interface plugs directly into the monitor and the color/graphics card.

Stephen Sarhad, San Rafael, CA

In Search of the Basic *Shell* Command

Having read the problems expressed by John Mastronardo (Questions and Answers, October 1983), I thought readers might be interested in a means of exiting from Basic for the purpose of executing DOS commands using the elusive *shell* command. It can be done simply by telling Basic where to resume processing when it has finished the DOS activities.

The following example should solve the problem:

```
70  JOB$ = "DIR" : GOSUB 950
80-940 'other Basic statements
950 '
960 DEF SEG : A = PEEK(&H30) : B =
    PEEK(&H31) 'get offset to start of
                program
970 SHELL JOB$ 'execute DOS command
980 DEF SEG : POKE &H30,A : POKE
    &H31,B 'restore offset to start of
            program
990 RETURN
```

Terry Chisholm, Cincinnati, OH

Assembling Life

I read Robert Fruit's article and studied his Pascal version of "The Game of Life" (September 1983). I found it very interesting and informative. Although I do not have a Pascal compiler, I am now learning assembly language. I decided to use your program as an outline and convert it to assembly language. While writing the program, some questions arose on the rules of the game.

The way I believe the program works is that it checks each cell one at a time and immediately turns the cell off or on. This of course affects the results in the next cell over. Shouldn't the computer really check all the cells within the matrix first, save the results, and then place all the results of the new generation in the matrix at once?

The patterns in my assembled version of Life do not seem to act the same as they should according to the article in the December 1982 issue of *Softalk* ("The Game of Life," by Forrest Johnson). It was assembled using *Chasm* from Freeware. Any suggestions would be appreciated.

Marc Melcher, Mount Kisco, NY

Mr. Melcher's letter clearly shows why he is having problems understanding how Life handles the lives evaluation. That aspect of the program was not explained in my article. The table of life values is the three-dimensional array POS[0..51,0..26,1..2]. The cell in the array directly corresponds with the life values seen on the monitor display. The 50 cells high are in the dimension 0..51 (the extra cells at 0 and 51 are for the life-evaluation formula and are always zero). The 25 cells wide are in the dimension 0..26, and the two life tables are the dimension 1..2.

When I first worked on Life I had the same problem that Marc had—that is, when a life is born or dies it affects the evaluation of nearby cells. The solution is to do the evaluation on the current life-values table and to store the results on the future life-values table. As the future life-values table is written, the image on the monitor screen is also written.

There are two places to look in the program to see the handling of the two life-values ta-

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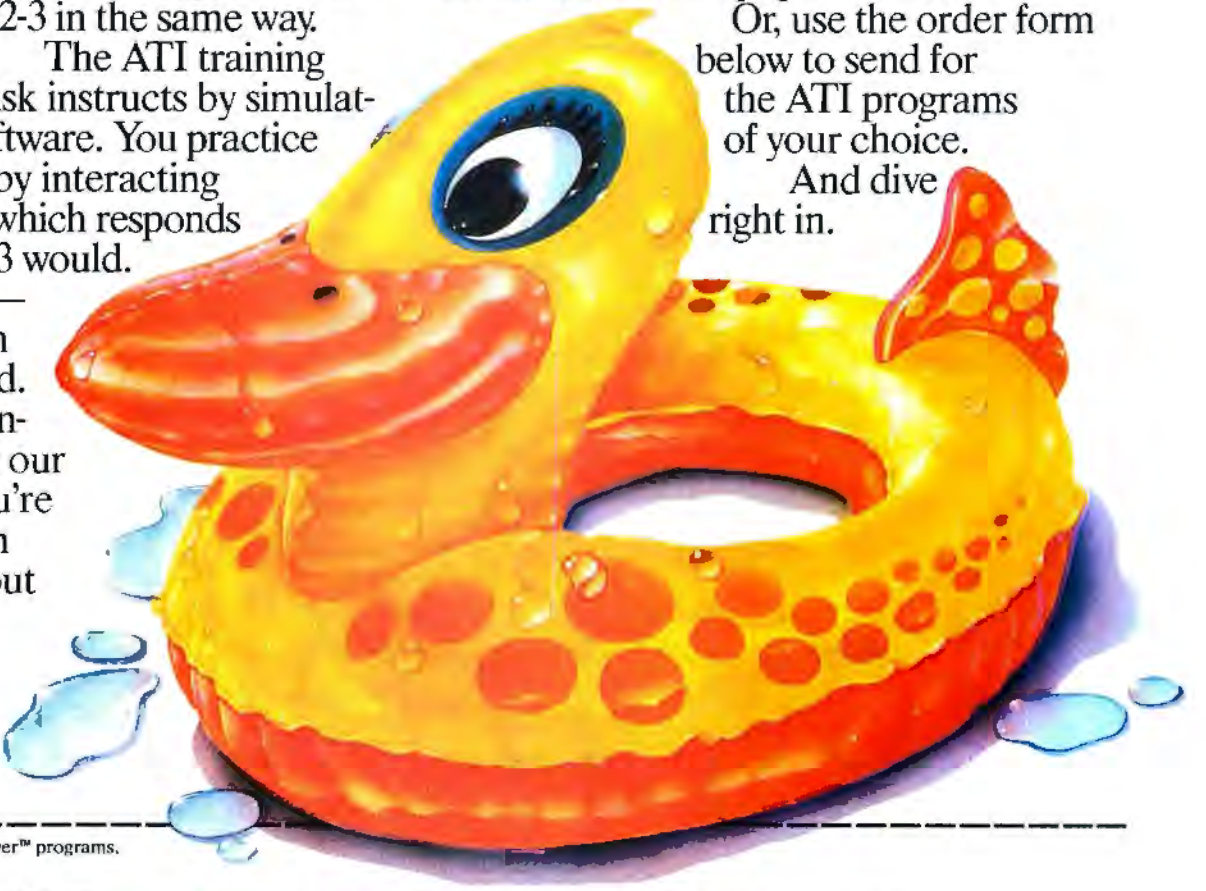

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bles. Before looking you must understand that there are two variables used to point to the two life-values tables, W and Z. W points to the current life-value table, and Z points to the future life-value table.

The first place to look is at the last seven lines of the program—that is, where the W variable is defined. As the program starts, W is set to 1 (Z is not set at this time). The for *statement four lines from the program end has the W variable count from 1 to 2. Then the* goto *statement that follows the* for *statement creates an infinite loop, so W keeps counting 1, 2, 1, 2, 1, 2. . ..*

The second place to look is the first statement in the procedure check. The procedure check is found in the last column of the program listing near the top of the page. That first statement is Z := W MOD 2 + 1;. *This statement is using modulo arithmetic on the variable W. For those unfamiliar with modulo arithmetic, IBM's Basic manual is a good place to find it. If W = 1, then* mod 2 *will give the result 1, and if W = 2, then the results are 0. Looking at that statement, it shows that Z is always set to 1 or 2 and its value is the opposite of the W variable. The W variable is used in the procedures TOGGLE, SET_UP, and the function LIVE. The Z variable is found only in the procedure check.*

If Life had been properly documented, Marc probably would not have had any problems understanding how the program worked. Proper documentation would have shown the uses for the variables and what each procedure and function did. Without the documentation he had to guess, and when he didn't catch the three-dimensional array POS, the way the program operates became a mystery.

Robert Fruit, Hinsdale, IL

REM, He Said

I learned a great deal of very helpful information about menu-driven programs in the excellent article, "What's on Your pc Menu?" by Dian Girard (October 1983).

However, when trying to apply it I found an error that will affect anyone trying to use it with DOS 1.1, which a high percentage of your readers have. For DOS 1.1, program line 210 should be changed from

```
210 PRINT #1, "ECHO now exiting to DOS.
    Goodbye from your friendly IBM Basic!"
```

to read:

```
210 PRINT #1, "REM now exiting to DOS.
    Goodbye from your friendly IBM Basic!"
```

The *rem* statement replaces *echo*. Otherwise, when exiting to DOS as you return to the initial batch file and Runit.bat is called, you get the following error message:

A>Bad command or filename

Echo functions as a comment statement in DOS 2.0 but not 1.1. This minor change will prevent the program from continually generating an irritating error message every time you exit to DOS 1.1. I hope this will be helpful to your DOS 1.1 readers.

Stephan J. Waszack, M.D., Seattle, WA

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QUESTIONS & ANSWERS

by Nancy Andrews

For the last few months we've had questions and answers about the *shell* command, a command that theoretically enables one to execute a DOS command from Basic. The general consensus was that while it looked like a nifty command, it appeared to be incompletely implemented and documented; in most situations it appeared not to work.

This month we offer the following letter from Robert B. Relf in Bothell, Washington, explaining what can be done to get *shell* to work in some situations. Thanks for sharing this information with us, Robert!

I first saw reference to shell *in your column, and I, too, was excited about the prospect of making use of DOS from within a Basic program. I had just subscribed to CompuServe and so I asked members of the IBM SIG, and they set me straight on* shell.

How would you like to call any DOS function from within a Basic program? How about using type *to send an ASCII file to the printer or the screen? Would you like to make use of pipes and filters to sort the output of* dir *to a file?* Format? Chkdsk? Copy?

The answer to your prayers lies in some additional peeks and pokes. Evidently, when the DOS function called by shell *is performed, it causes Basic to lose track of where your program is in memory. This information is stored in two bytes at &H30 and &H31 (def seg = 0). Before using the* shell *statement, you must peek at the values in these two locations and store them in two variables. Immediately upon returning to Basic, poke these values into their original locations and your program can then go merrily on its way.*

It is possible that a DOS function that uses a lot of memory may step too heavily on Basic's toes and cause a crash, so experiment with the specific function and be sure to save your program before you run it.

*I have found that if you are using a display page (*screen, apage, vpage*) other than 0 on the color/graphics adapter, screen output from the DOS function will not be printed correctly, and when you are returned to Basic the display page will have defaulted to 0. The solution is to set the display page to 0, use the* shell *command, then return to the previous display page.*

Here is a short listing that demonstrates how to use the shell *command:*

```
10 INPUT "ENTER ANYTHING YOU WOULD ENTER AT THE
   DOS PROMPT",SHEL$
20 DEF SEG: A = PEEK(&H30) : B = PEEK(&H31) 'get offset to
   start of program
30 SHELL SHEL$ 'execute DOS command
40 DEF SEG : POKE &H30,A : POKE &H31,B 'restore offset to start
   of program
50 PRINT "YOU ARE BACK IN BASIC"
60 GOTO 10
```

We also got a cautionary phone call about the *shell* command from Paul Hoffman of Proper Software. He claims that what the command does is trash the beginning of the data segment—but not in any predictable way. So. . .experiment and use *shell* at your own risk.

Q: I have had some problems loading and calling a machine language subroutine loaded into a Basic array. When I simply *bloaded* the code into the top of Basic's memory, there was no problem, so I know the code is okay. However, when I tried the following, it didn't work; it froze the system or just didn't perform correctly:

```
1000 DIM A%(300): FOR I=0 TO 299: A%(I)=0: NEXT I
2000 PLACE = VARPTR(A%(0))
3000 BLOAD "FILENAME.OBJ",PLACE
4000 SBRT = PLACE
5000 CALL SBRT(K)
```

(Sbrt is the subroutine whose code is in the file "filename.obj".)

I wrote a smaller test program in Basic and tried again and had success by letting Place = *varptr(A%(10))*, but this wouldn't work in my longer program. I also tried adding various *def segs*, but that didn't help. I printed the array A% after step 3000, and things seem okay as far as the loading is concerned.

Mark Bridger

A: Your problem occurs because you declare a new scalar variable after you've allocated space for your array and used the *varptr* command. What this does is change the location of the array, so when Sbrt is called, it's no longer where you expect it.

You can correct this by declaring or initializing all your variables before the *varptr* statement. If, for example, you added the line:

```
1500 SBRT = 0
```

to allocate space for the variable Sbrt before *varptr*, you would avoid the problem.

Q: I have recently become interested in assembly language programming. I would like to know where I can find a description of interrupts for BIOS and DOS, what they do, and how to use them. I have the *Technical Reference* manual but have been unable to find anything about interrupts except for what is in the BIOS listing in

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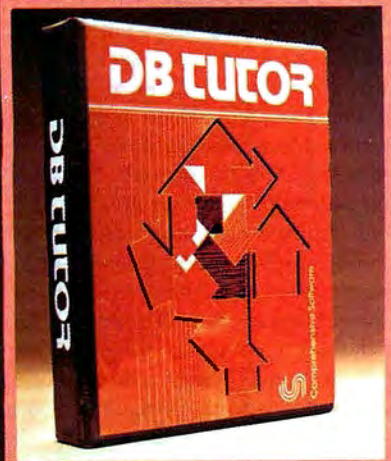

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Appendix A, which explains only some of the BIOS interrupts and none of the DOS interrupts. I am especially curious about INT 21, the DOS function call, which I have seen referred to often but never have had explained.

David Meyer

A: You asked the right question! Leo Scanlon's book, *IBM PC and XT Assembly Language, a Guide for Programmers*, is the resource you need, and it's excerpted in this issue (page 44).

Q: I've enjoyed *Softalk*'s series on how Basic stores numbers, variables, and programs. I've been studying them, but there is still one thing I can't figure out: Where does it store them?

I was hoping you'd explain how to peek at an address from Basic, then how to decipher which location the contents of that address point to.

Betsy Simnacher

A: First of all you need to determine where you want to peek. Table 2 of the July article (p. 38) gives the locations of Basic's pointers. What you do first is peek at the contents of the pointer location; then you use what you find there as the address to peek at parts of Basic—variables, code, Basic's stack, or whatever.

For example, let's suppose we want to look at the start of the simple variables. Table 2 tells us that &H358 and &H359 are the pointer to the start of the simple variables. These two addresses form a two-byte number that represents the address at which the simple variable storage begins. To read that two-byte number we do the following:

```
PEEK (&H358) + 256 * PEEK (&H359)
```

&H359 holds the high-order byte of this two-byte number, so we have to multiply the value at that address by 256 before adding it to the value at &H358, in order to convert the pointer to a decimal number. Now if we print the result of this peek and then peek at the address this statement produces, we should see our Basic program's first simple variable.

Here is a short program to do this:

```
10 DEF SEG      'set the segment to 0
20 X = PEEK (&H358) + 256 * PEEK (&H359) 'to read the
pointer
30 PRINT X      'the location of the first simple variable
40 PRINT PEEK(X)
```

To read any of the other pointers shown in table 2, substitute the appropriate numbers for &H358 and &H359 in line 20.

Q: I have written many programs to plot data in high-resolution graphics mode but have been unable to print out these plots on my printer. Are there any programs or commands available to print out the high-resolution screen?

William J. Stoeffel

A: In the July issue of *Softalk*, the article "From Screen to Dump in Almost 60 Flat" presented a high-resolution screen dump program. You can get a copy of the article and type in the program yourself or, to receive a disk with the program on it, send eight dollars to:

Softalk Dumpscrn
Box 60
North Hollywood, CA 91603

Q: I have two questions for you. First, is there any reference source for the use and abuse of the officially "unused" (read: unpublished) pc X'21' interrupts? In particular, I'm curious about the purpose of function 01CH, which is called from the utility Chkdsk.com. It's a disk-oriented interrupt that appears to do some checking of the file allocation table.

My second question is, what does DOS do when it exits a program back to the system? I know that INT 20H is called, which in turn calls three other system interrupts for cleanup work. What I really want to know is how to intercept the usual return to DOS and redirect it to a .com program I've written and saved with INT 27H. I'm writing a command shell and want to intercept DOS at the last possible moment. There's very little information on this in the *Technical Reference* manual. Any ideas?

Steve Manes

A: Function 1B and 1C are identical. Both contain the return address of the file allocation table. They really don't do any checking of the FAT. It's up to the program to use this address and do its own checking. You're right; there is little information about this.

There are two ways you can intercept the usual return to DOS and redirect it to another program. The first is to use DOS interrupt 4B. This enables you to load and execute your second program from your first—and then have control return to your first program.

The second way is to change the terminate address stored in the program segment prefix. This is the address used by interrupt 20 to clean everything up (see page E-8 of the DOS 2.0 manual). You could change this address to the starting address of your next program. The terminate address is four bytes long (segment plus offset), and you can change it in the program segment prefix (psp) or change the interrupt 22 vector. At offset 16H in the program segment prefix there is a sixteen-bit segment pointer to the psp of the parent process. Save the current value of this and change it to point to the psp of your next program. Then when your second program is finished, you will need to do your own cleanup. Restore the psp pointer so it points to the program segment prefix of the parent process and restore the interrupt 22 vector. ▲

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COMM LINES

by Kevin Goldstein

Plugging In

Purchasing a modem can be hazardous to your pocketbook. Installing it can be hazardous to your sanity. This month, we'll examine some of the issues involved in mating a modem to your pc and then getting the whole shebang on-line with a remote station.

Since any modem is designed to connect a digital computer to an analog phone line, it follows that modems must have two interfaces: a digital one that connects to the computer and an analog one that connects to the phone line. From a user's point of view, the analog interface is far easier to deal with than the digital interface.

In the early medieval days of computers, the omniscient Ms. Bell deemed it an absolute no-no to connect any type of "foreign" equipment directly to a Bell phone line. (The word *foreign* was Bell's term, used to denote, rather pejoratively, non-Bell equipment.) Home computers were, of course, virtually unknown then (except to those odd souls who managed to sneak a PDP-11 into their attics); so at first nobody considered it particularly outrageous that you had to contact the telephone business office before you could connect a modem to your phone line.

If you called the business office they would send out a serviceman, who would proceed to install what was probably the most useless piece of telecommunications equipment in the world: a DAA, or direct access arrangement. The DAA connected to the phone line; you, the subscriber, connected your modem to the DAA. The phone company's rationale for the DAA was that it was necessary to protect Bell's apparently delicate lines from damage caused by incorrectly designed foreign equipment.

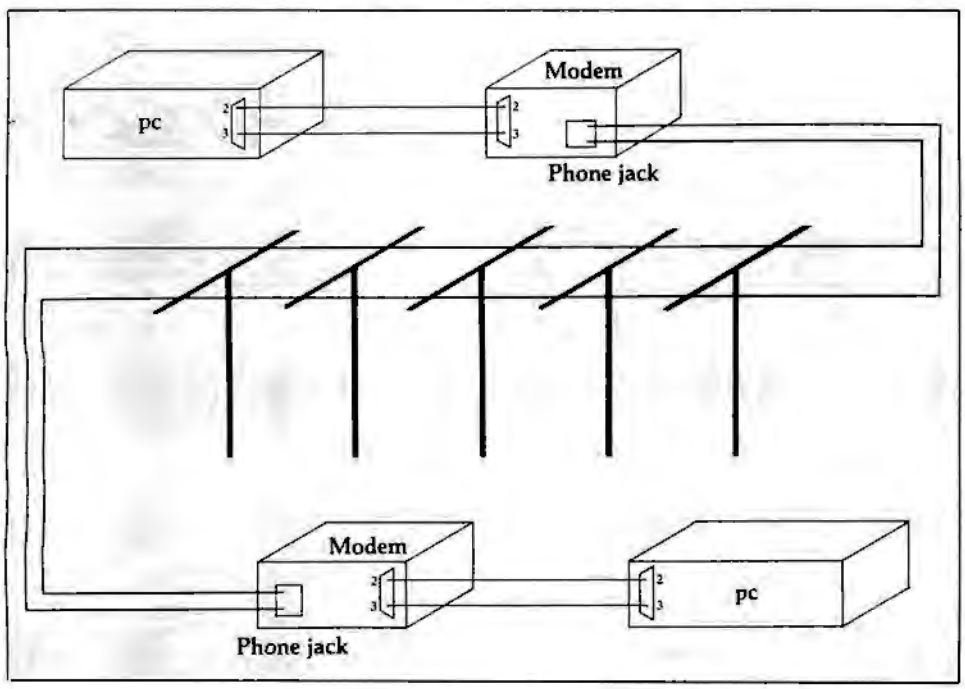
Fortunately for us, one of the first things the phone company lost on the long road from monopoly to competitive enterprise was the privilege of being able to require a DAA. The Federal Communications Commission has decided that as long as equipment conforms to its (the FCC's) rules, it may be connected directly to the phone line.

That FCC decision was the first element that simplified connecting a modem to a telephone line; the introduction of the modular phone jack was the second. Since most houses are by now wired for the small modular jack known as the RJ11C, connecting a telephone is as simple as plugging in a light; modems connect the same way phones do, using the same jacks and cables. So all you have to do to connect your modem to the phone line is unplug a phone and plug in the modem. If you need a phone cable, you can simply steal one from the unused phone.

In fact, any of the plugs, sockets, or equipment used to connect your phone can also be used to connect your modem. If you're short a phone socket, it's perfectly legal to purchase a two-into-one phone jack, normally meant for connecting two phones to one jack; in this case, simply substitute a modem for the second phone.

Before you traipse on down to your local Radio Shack to purchase a two-into-one jack, though, take a good look at the back of your modem (or wherever the connectors are; that's usually the back). If you see two phone sockets rather than one, the modem itself is effectively giving you a two-into-one jack. If you've got a modem with two sockets and you want to connect both the modem and the telephone to the same wall socket, first unplug the phone cable right at the phone and then plug the free end into one of the phone sockets on the back of the modem (it will probably be marked something like *line*). Now, using the cable that came with the modem, connect one end into the other socket on the back of the modem (probably labeled *phone*) and the other end into the telephone itself. You can now use both the phone and modem as if they were plugged into two independent wall sockets.

Incidentally, the fact that the two sockets on the back of the modem are labeled *line* and *phone* might lead you to believe they are in



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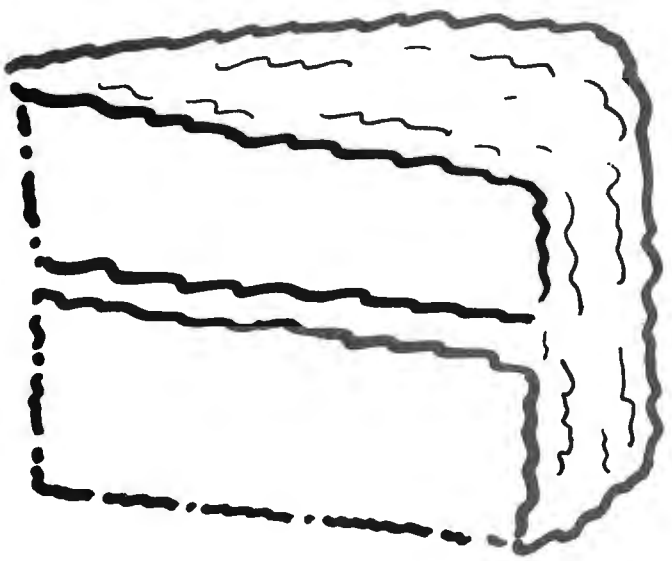

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some way different. And theoretically they could be; the modem could include circuitry for disconnecting the phone when the modem was in use, for example. In general, however, that will not be the case; most, though not all, of today's modems simply connect the two plugs in parallel—meaning the two plugs are electrically identical. Just to be on the safe side, however, if the sockets are labeled, connect according to the labels.

That pretty much takes care of the first of the two modem interfaces, the phone-line connection. The other interface, the connection to the computer, is not quite so simple.

With the exception of those modems packaged as cards that plug directly into a pc expansion slot, almost all modems connect to your pc via a standard interface known as EIA RS-232C, usually simply called an RS-232 interface. (The *EIA* stands for Electronics Industry Association, the professional association that promulgates the standard.)

RS-232 is a low-level standard, which means it specifies only the mechanical and electrical interconnection and says nothing about the actual data that can go on an RS-232 line. RS-232 knows nothing of bits, bytes, data timing, ASCII, EBCDIC, et cetera. All the standard does is define a mechanical interface (the physical plug and socket, and which signals appear on which pins of the socket) and the electrical interface—that is, what the voltage levels must be.

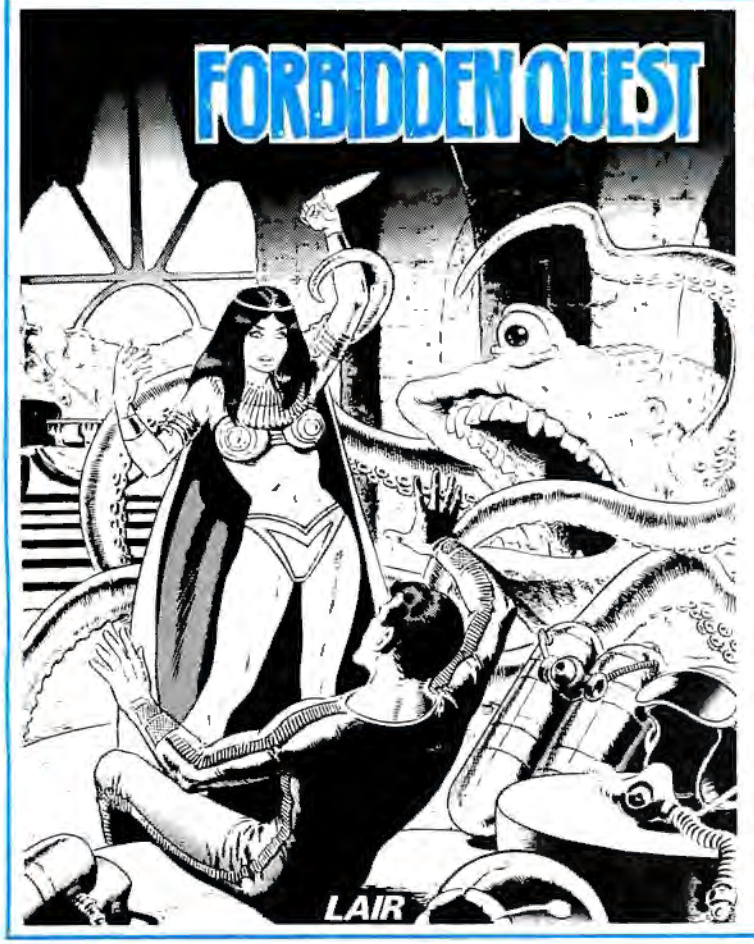
Mechanically, the RS-232 interface specifies a twenty-five-pin, rectangular connector. (Rumor has it that the long and thin rectangular shape was chosen simply to frustrate hobbyists, since it's virtually impossible to cut a clean, thin, rectangular hole in a chassis without special equipment.) The connectors on both the back of the modem and the pc should be females, meaning the cable you want to connect the modem to the pc should have male plugs on each end. (Just to be on the safe side, check this detail before you purchase your cable. If you don't see any gold or silver metal pins, you're looking at a female connector.) The connectors go under the more or less universal part number of DB-25; so if you decide to make your own cables, you should get the right thing if you ask for two DB-25 male connectors.

If making your own cable sounds like a real pain in the neck, it is—and this column is certainly not recommending it; pay the fifty-five bucks and get a professionally made cable that will (probably) work. (Before you buy a cable, make sure your modem manufacturer didn't supply a cable gratis with the modem.) On the other hand, if you stay involved with computers long enough, the day will come when you discover the need for a cable that your local computer store doesn't seem to have. This column will discuss just how that situation might arise and give you the facts necessary to deal with it. Let's start by taking a closer look at the RS-232 plug.

One of the things the RS-232 standard does is assign a unique function to each of the twenty-five pins of the standard DB-25 connector. If that sounds like a lot of signals just to connect a modem to a computer, well, it is; and in simple situations such as connecting low- to medium-speed asynchronous modems, most of those lines aren't used.

In the simplest case, only three of the twenty-five pins of the RS-232 connector are necessary to connect your modem to your pc. You can probably imagine what two of those lines must be: transmitted data and received data. The other line is the ground line; as you may recall from an earlier column on circuit basics, a ground line is needed as a return path for the electrons running around an electrical circuit. In this case, as in many cases in computer circuitry, a single ground line is shared by many otherwise independent circuits.

The RS-232 standard assigns transmitted data to pin 2 of the connector, received data to pin 3, and ground to pin 7. (There are actually



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two ground pins, one called signal ground, the other chassis ground. Chassis ground is more or less the equivalent of the third wire in a grounded electrical plug; the RS-232 chassis ground is on pin 1. Signal ground on pin 7 is the line of interest to us.)

And of course you know what transmitted data means: data transmitted from the modem to the computer. Or. . .no, maybe it's data transmitted from the computer to the modem. Hmmm. Seems there's a little ambiguity here, doesn't it?

That "little" ambiguity has probably been the cause of more confusion and problems than any other single aspect of the modem-computer connection. While on the surface the problem looks absolutely trivial (how many times have you heard that before?), in actuality it's important enough to warrant special attention.

In order to overcome the ambiguity raised by signal direction—who's transmitting on what line and who's receiving on that same line—the RS-232 interface defines two broad classifications of equipment: *data terminal equipment*, or *DTE*, and *data communications equipment*, or *DCE*. DTE in general refers to the computer or data processing equipment; DCE refers to the telecommunications gear. Thus your pc is considered data terminal equipment, while your modem is considered data communications equipment. In the normal state of affairs, the RS-232 interface is used to connect a DTE at one end to a DCE at the other. (Are you totally confused yet? If not, hang in there.)

Data terminal equipment transmits its data on pin 2 of the RS-232 connector and receives its data on pin 3. Data communications equipment receives its data over pin 2—the same line the DTE is transmitting on—and transmits its data over pin 3, the same line the DTE is receiving from. Now since your pc is considered a DTE and your modem a DCE, they can be connected to each other simply by connecting pin 2 from the pc's RS-232 connector (transmit data of DTE) to pin 2 of the modem (receive data for DCE), and pin 3 of the pc's RS-232 connector to pin 3 of the modem (receive data of a DTE to transmit data of a DCE). That's convenient, since it results in a straight cable, meaning pin 2 goes to pin 2 and pin 3 goes to pin 3. (Signal grounds, pin 7, are always connected together. If your communications channel is acting as if it has just dropped acid and you have ruled out software as the likely culprit, the next thing to check for is a missing or intermittent connection of the ground line, pin 7.) Indeed, for some modems, that simple three-wire cable is all that's necessary.

Up to now, we've assumed we're connecting a modem to a computer. In technical jargon, that means we're connecting a DTE to a DCE; since that is the configuration for which the RS-232 standard was defined, such a connection presents us with no special problems (at least not yet).

But now suppose for a minute we've just bought a second computer on sale. At the time, it looked like a good deal. The computer had everything we were looking for in a second computer, and it even came with an RS-232 port, which gave us a convenient way to pass data between it and our pc.

Right now we think maybe we've figured out why the computer was so cheap: The RS-232 interface doesn't work, so God only knows what else is broken. Oh, it'll run the self-test okay, but connect it to the computer via the RS-232 port and nada. Won't even beep.

But hang on. Before we go blaming the second computer, let's take a closer look at the RS-232 connection.

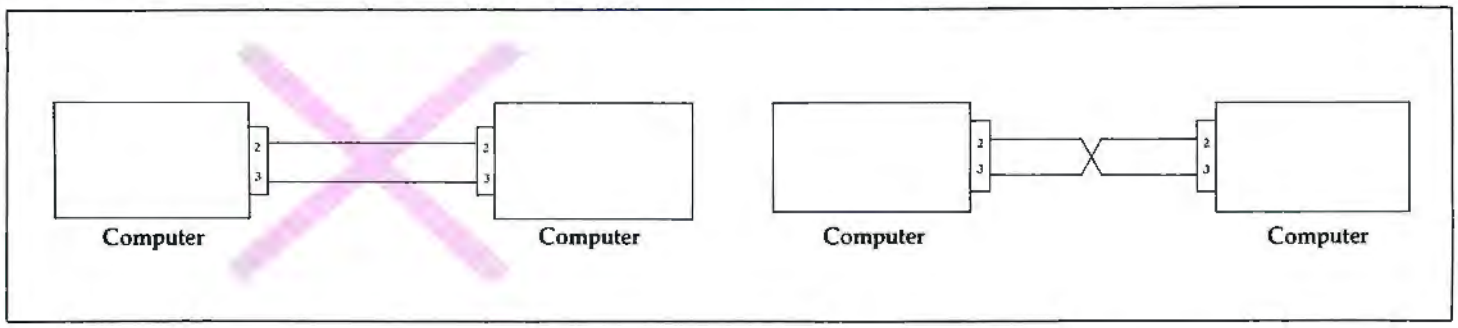
Right off, the first question we've got to ask ourselves is this: Is it even legal to connect a pc directly to another computer via an RS-232 line? Doesn't the RS-232 interface require a modem?

No. No, no, no, no, and no. Just as the RS-232 interface knows nothing about the type of data going across it—bits, bytes, ASCII, EBCDIC, 300 baud, 1200 baud, or 45.5 baud—it also doesn't know or care what type of equipment it is connected to, *as long as that equipment's interface conforms to the RS-232 standard.*

Which leaves us with two possibilities. Either our new computer's interface doesn't conform to the RS-232 standard or it's got a bum interface port.

By now maybe you've figured out just what's going on here. A computer is always configured as data communications equipment, meaning it will transmit data on pin 2 and receive data on pin 3. Connecting one computer to another via an RS-232 interface and two modems (one at each end) is normally no problem, since the presence of the modems takes care of the fact that both computers want to transmit data on the same line. When we tossed the modems out of this particular interface, we were left with two pieces of gear that were both configured as data terminal equipment; that meant both computers were trying to transmit data over the same line (pin 2) and both were trying to receive over the same line (pin 3). That's like two people talking at each other with neither listening, or two people listening to each other when neither is saying anything.

The most obvious way around the problem is simply to stick the modems back into the equation. That, however, is both abysmally expensive and utterly unnecessary. All that's required is to pull the wires off pins 2 and 3 at one (either one, but only one) of the connectors and reverse them. Then computer A's transmit data on line 2 becomes computer B's receive data on line 3, and the whole problem is resolved.



Of course, computers are not the only pieces of equipment considered to be DTEs. Printers are also likely to be configured as DTEs; so if you have a printer that connects to your computer via an RS-232 interface, you might find it necessary to pull the same trick.

Unfortunately, there are no hard and fast rules determining whether a particular piece of equipment should be configured as DTE or DCE, except that computers are almost always DTEs and modems are always DCEs. Knowing what you now know, however, you should be able to check the manual that comes with the equipment (the list of specifications at the back is frequently a good place to start) for an indication of whether you'll need to reverse the transmit and receive data lines.

Up to this point, our discussion of the RS-232 interface has been limited to a simple three-wire implementation, which indeed is sufficient for many modems that do not use handshaking protocols. And therein lies the topic of next month's installment, which will also have us looking at the other twenty-two of the RS-232 lines. ▲

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THE BASIC SOLUTION

by Joe Juhasz

Mixing Text with *Put* and *Get*

As you may already know, when you are in medium-resolution graphics mode on the IBM Personal Computer, all printing defaults to color 3 in whichever palette you're currently using. Color 3 is white in palette 0 and yellow in palette 1. The Basic *poke* statement offers you a way to create colored text easily by means of the *print* statement. (See line 1060 in this month's program.)

The *print* statement in medium-resolution graphics limits you to forty characters per screen line. At times it would be nice to be able to display more than forty columns of text on a line. There isn't any simple *poke* that permits this, but the Basic *get* and *put* statements do provide a way to display two different sizes of text on the same screens.

***Get* and *Put*.** To refresh your memory, *get* takes a graphics image from the screen and stores it in a Basic array variable. *Put* can display a graphics image from a Basic array variable that previously had been saved by means of the *get* statement. The fact that hi-res graphics saved by the *get* statement can be displayed in medium-resolution graphics mode means that it is possible to mix two text sizes on the screen. As a side benefit, the text so mingled appears in an attractive ticker-tape format.

Our program this month is in two parts. The first creates an array containing graphics images of all the characters in all three colors in both forty- and eighty-column sizes. This array is *bsaved* to disk for future use.

The example stores ninety-six characters (ASCII 32 through 127) in three colors in large size and in one color in small size. Thus there needs to be room for 4 * 96, or 384, characters in Save.array!. Each character requires sixteen bytes of storage. Each element in Save.array! is four bytes, so we will need four elements in Save.array! to store each character. The dimension statement at line 1010 gives Save.array! enough room for all the characters.

```
1010 DIM SAVE.ARRAY(383,4)
```

Part 2 of the program brings in the previously *bsaved* image and uses it to display text at various sizes and colors.

```
10 '  ***----------------------------------------------------------------***
15 '  ***---  The following program will create a BLOADable image    ---***
20 '  ***---  on disk. This BLOADable image can be used to display    ---***
25 '  ***---  text in different colors and sizes in medium or high    ---***
30 '  ***---  resolution graphics modes on the IBM Personal Computer. ---***
35 '  ***---                                                          ---***
40 '  ***---  The program also contains code that can be used to      ---***
45 '  ***---  display the text in various sizes and positions.        ---***
50 '  ***----------------------------------------------------------------***
55 '  ***---                  by: JOSEPH JUHASZ                      ---***
60 '  ***----------------------------------------------------------------***
65 '
70   DEFINT A-Z
100  '***--- Ask CREATE or USE ---***
110     CLEAR: CLS: WIDTH 80
```


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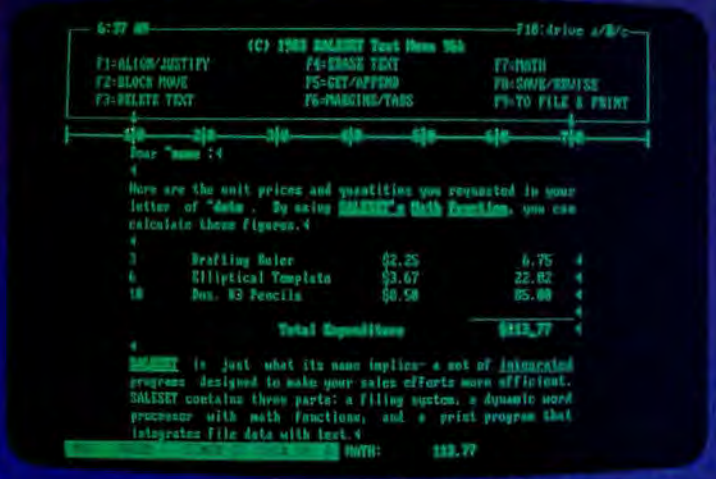

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```
120       PRINT "ENTER:  1 - To create and save bload image 'PCXTEXT.BSV' on default drive"
125       PRINT "        2 - To load & test bload image"
132       PRINT "        3 - To exit to BASICA"
140     INPUT ANS$
150     IF ANS$<"1" OR ANS$ > "3" THEN BEEP: GOTO 140
160     ON VAL(ANS$) GOSUB 1000,2000,200
170   GOTO 100
200   CLS: END
1000  '***--- create and save BLOAD image ---***
1010      DIM SAVE.ARRAY!(383,4)          '-Dimension array to be bsaved
1020      DIM ARRAY!(4)                   '-Dimension array to be used for GETs
1030    '**-- first get all LARGE (medium res) characters --**
1040      SCREEN 1,0                      '-Place into medium res graphics mode
1050      FOR KOLOR=1 TO 3                '-Cycle thru the 3 colors
1060        DEF SEG: POKE &H4E,KOLOR      '-Set PRINTs to use KOLOR
1070        CLS                           '-Start with a CLS
1080      '**-- Print and save all characters from ASCII 32 to 127 --**
1090        FOR I=32 TO 127
1100        I.POS = (KOLOR-1)*96 + (I-32)     '-Calculate offset into array
1110        LOCATE 1,1: PRINT CHR$(I)         '-Print character in top left corner
1120        GET (0,0)-(7,7),ARRAY!            '-GET character into ARRAY!
1130        FOR J=0 TO 4                      '-Save into SAVE.ARRAY!
1140          SAVE.ARRAY!(I.POS,J)=ARRAY!(J)
1150        NEXT J
1160      NEXT I
1170    '**-------------------------------------------------------**
1180    NEXT KOLOR
1190    '**-------------------------------------------------------**
1200  '***--- Now get SMALL (high res) characters ---***
1210      SCREEN 2,0                      '-Place into high res graphics mode
1220      CLS                             '-Start with a CLS
1230    '**-- Print and save all characters from ASCII 32 to 127 --**
1240      FOR I=32 TO 127
1250        I.POS = (KOLOR-1)*96 + (I-32)     '-Calculate offset into array
1260        LOCATE 1,1: PRINT CHR$(I)         '-Print character in top left corner
1270        GET (0,0)-(7,7),ARRAY!            '-GET character into ARRAY!
1280        FOR J=0 TO 4                      '-Save into SAVE.ARRAY!
1290          SAVE.ARRAY!(I.POS,J)=ARRAY!(J)
1300        NEXT J
1310        NEXT I
1320    '**-------------------------------------------------------**
1330  '***--- Save images to diskette ---***
1340    DEF SEG: ADR!=VARPTR(SAVE.ARRAY!(0,0))  '-Get address
1350    DEF SEG: BSAVE "PCxtext.bsv",ADR!,7693  '-Save image
1360  RETURN
1370  '
1380  '
1390  '
2000  '***--- Bload image and test results---***
2010    DIM ARRAY!(4), SAVE.ARRAY!(383,4)
2020    DEF SEG: ADR!=VARPTR(SAVE.ARRAY!(0,0))
2030    DEF SEG: BLOAD "PCxtext.bsv",ADR!
2040    SCREEN 1,0                              '-Place in medium res
2050  '***--- Test results ---***
2060    CLS
2070    LOCATE 1,1: PRINT "ENTER: character string to display"
2080    INPUT ANS$
2090    FOR KOLOR=1 TO 4                        '-Show in 3 colors and tiny
2100      X=0: Y=100+(KOLOR*10)                 '-Set X,Y location to display
2110      FOR I=1 TO LEN(ANS$)                  '-Cycle thru each letter of string
2120        ICHAR$=MID$(ANS$,I,1)               '-Get the next letter
2130        ICHAR=ASC(ICHAR$)                   '-Get ascii value
2140        I.POS = (KOLOR-1)*96 + (ICHAR-32)   '-Determine position in array
2150        FOR J=0 TO 4                        '-Put it into a single dimension array
2160          ARRAY!(J)=SAVE.ARRAY!(I.POS,J)
2170        NEXT J
2180        PUT (X,Y),ARRAY!,PSET               '-Put the character on the screen
2190        IF KOLOR<>4 THEN X=X+8 ELSE X=X+4   '-Increment X for next character
2200      NEXT I                                '-Next character
2210    NEXT KOLOR                              '-Next kolor
2215    LOCATE 24,1: PRINT "... Press any key to continue ...";
2216    IF INKEY$="" GOTO 2216
2220  RETURN
```

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Everything's Coming Up ProKey

Nestled among the disparate melange of pizza joints, tiny restaurants, and fraternity houses surrounding the University of

Washington is a grand old six-floor Victorian apartment building called the Wilsonian. Its elegance faded though not vanquished by the years, the building looks as displaced as a proper English gent in a trendy disco.

While the Wilsonian might seem out of place in a university district, David Rose, co-founder (with his wife Eileen) of RoseSoft, seems perfectly at home here. Indeed, with his reserved, polite manner, perfectly groomed good looks, and flawless attire—his tie is still snug around his neck, although it is quite late on a Friday—young Rose would look quite correct sipping Earl Grey in a British tearoom.

But David is neither British nor terribly young, and RoseSoft—the company Eileen and David run from two apartments on the top floor of this unlikely building—is anything but staid. In just over a year, RoseSoft has grown from nothing to a million-dollar company with a staff of ten, and the growth curve isn't even tapering off yet. The firm's phenomenal growth has come on the strength of just one product, *ProKey*, a piece of software so innovative and useful that it took the pc market by storm when it was introduced in November 1982.

Such growth didn't occur by accident. While some companies are the lucky babies of chance encounters, it's clear from what the Roses say that RoseSoft was a thoroughly planned child.

The planning behind RoseSoft actually goes back to 1978, when David Rose decided it was time to move on from the Jet Propulsion Laboratory, the prestigious research institution associated with Cal Tech. Save for a couple of

RoseSoft

by Kevin Goldstein

minor interruptions, Rose worked at JPL from 1962 to 1978. If you've ever wondered about the people who perform the incredibly complex calculations required to put a spacecraft into orbit, wonder no longer: David Rose was once one of them. From orbit determination, Rose moved into telecommunications, which turned out to be a problem so big that the programs couldn't fit into the low-powered computers of that era.

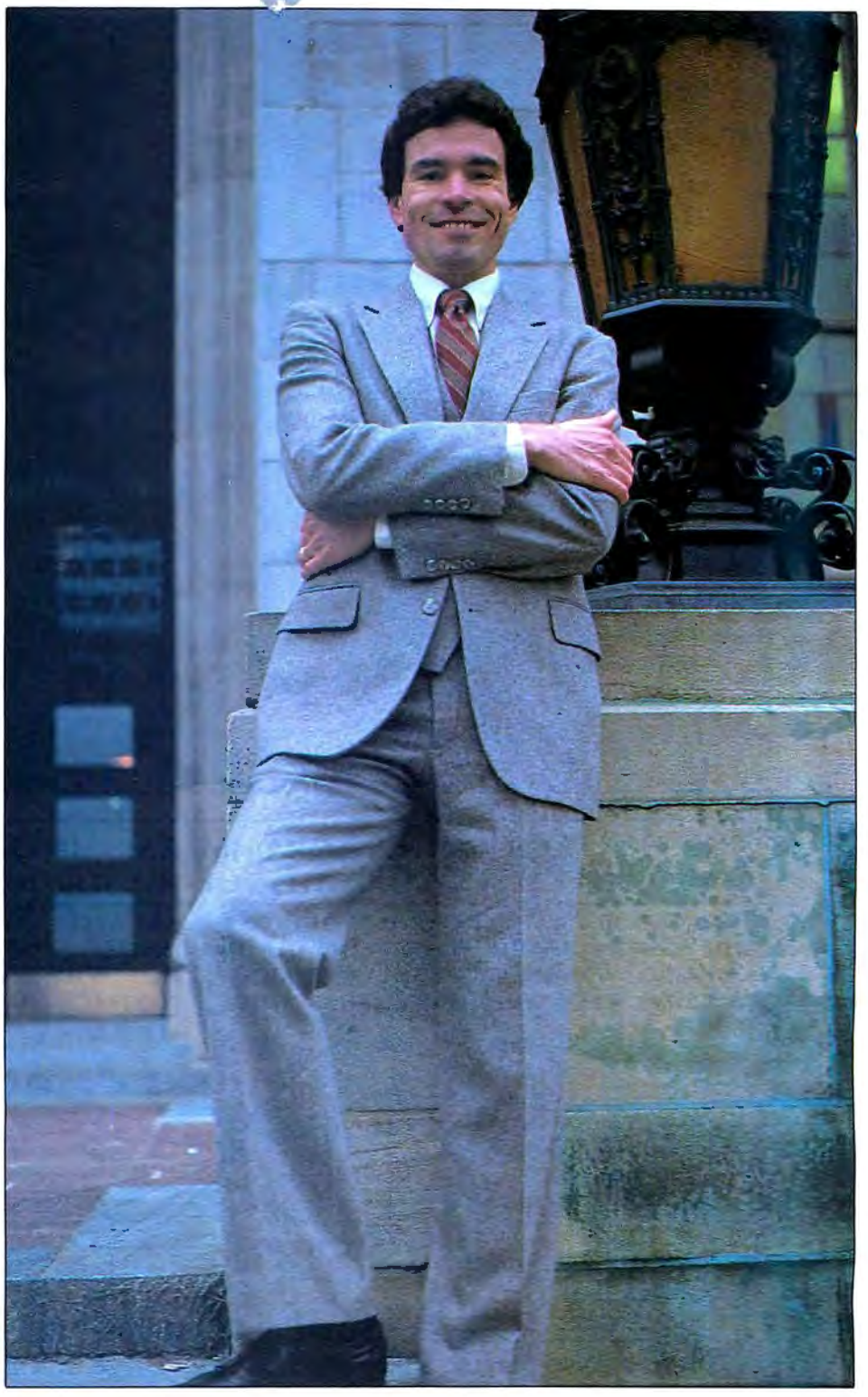
"They needed somebody who understood the innards of the computer," Rose explains, "so that parts of a large program could be swapped in and out." In other words, Rose started working with operating systems.

"That was about the time operating systems were being invented," Rose says, "and I got drafted to do work on that. I became sort of a de facto specialist in operating systems. From that followed a very natural progression to working on the interface between man and the computer,".

It's impossible to talk to either of the Roses for very long without that word "interface" coming up; it's a key concept in almost all of the work David Rose has done in his extensive career in computers.

Rose left JPL briefly to work in management at a custom software house, but he returned in 1972, this time as a manager. First he supervised the group doing the trajectory programming for Viking, then he managed the mission control software project for Voyager (which, incidentally, is still operational).

By this time it was clear that Rose's principal interest was in the interface between people and computers. As a manager, Rose had a highly practical motivation to tackle that particular subject. As he explains it, "By then I had a whole lot of people working for me, on a whole lot of different computers and projects, ranging from technical people whose computers were digesting navigational problems to managers using computers to solve work-flow problems. To get the most out of my people, the efficiency of people using computers became my full-time occupation for the last few years I was at JPL. And of course the element



RoseSoft cofounders Eileen Rose (facing page) and David Rose (right) have built a million-dollar company on the success of ProKey.

that's absolutely critical to that efficiency is the man-machine interface."

Toward the end of his time at JPL, Rose notes, a lot of work was being done on the problem of interfacing microcomputers with mainframes. As part of the man-machine interface, he found himself working extensively with both computer languages and graphics, two areas that have remained his abiding interests.

But a big change was in store for Rose: He was about to enter into that most sacred of American institutions, coupledomhood. (Marriage came two years later.) The lady's name was Eileen, and her almost regal bearing and equally reserved manner make her seem a perfect match for David. He met her at Cal Tech, where she was doing research in neurophysiology.

Eileen picks up the history:

"I was getting tired of academics, and David was getting tired of the bureaucracy at JPL, so we decided to look for a career change," she says. They did the only natural thing for any couple contemplating a major life-shaking career change: They went skiing in Utah.

"It took a long time to decide what to do," David says, which is no surprise, considering all the skiing they had to do. In any case, there followed a rather checkered series of moves, which saw the couple first working at the University of Utah—he networking microcomputers, she doing research with artificial organs—touring Mexico, then checking out the Philippines as a prelude to accepting an offer from the Peace Corps.

RoseSoft is guided by (left to right) Eileen Rose, president, Barbara Birdsall, director of marketing, and David Rose, manager of product planning.

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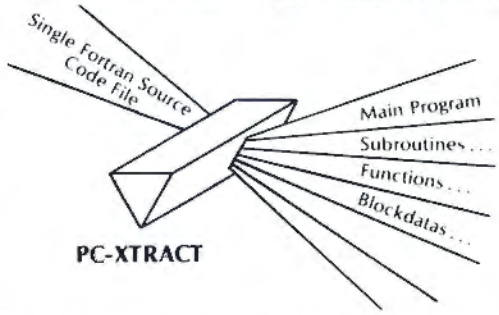

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"But the tropics were hot," David notes, almost as if he had thought they could go skiing around the equator. Which probably explains why, after a thorough search of all likely cities, the Roses decided to settle in Seattle, with its mean temperature of about 55 degrees. Like almost every other important thing the Roses did, the move was carefully planned.

"We knew by then that we wanted to start a business and that it would probably have something to do with personal computers," Rose explains. "So we wanted to find a good city to live in, and it had to have a good community for computers. We had certain criteria that a city had to meet, and we also had to like it, of course. Seattle was the first city that filled the bill. Or maybe," he concedes, "it was just the last place we looked, and we were tired of traveling." In any case, that's how RoseSoft ended up in Seattle.

The target machine had to have a little memory to burn.

From August 1981, when they arrived in Seattle, until January 1982, the couple was essentially looking for a way to do business in that city. Both were tired of large institutions and bureaucracy, so while it was only logical to use their long professional careers in computers and management as the underpinning for a new venture, it was probably just as logical that the computers would have to be as small and personal as possible—personal computers, of course. Various business ideas were considered and discarded; likewise, a search for business partners came to naught.

"We decided to just go it alone," David recalls. The two formed ProSoft, later changing the name to RoseSoft because of a conflict with an existing company. The "Pro" in the name was meant to signify both their extensive professional experience and their dedication to offering products of professional quality.

A big company approach to small-computer software is not the only thing that makes RoseSoft stand out among the legions of high-tech companies surrounding the personal computer. RoseSoft is also one of the few microcomputer companies headed by a woman. When ProSoft/RoseSoft was incorporated, Eileen was named president, David manager of product planning. Though they decide together the direction the company will take, daily management of the company is handled by Eileen.

But back to the story. The pc had just come out. While evaluating what specific area to go into, the Roses decided their target machine would be the newly introduced IBM pc. That decision came at Christmas 1981; the Roses went out and bought their first pc almost the same day.

But why the pc?

"Not," says David, "because it was obvious that the pc was headed toward being an all-time bestseller." According to David, the problem with all personal computers up to that point was lack of memory. With its sixteen-bit architecture allowing for a half-megabyte or more of memory, "the pc looked to be the first personal computer with the power to support the kind of programs I wanted to do."

The kind of programs he wanted to do were co-processes—that is, programs that, although small, had to be constantly resident in memory in order to carry out their job of expediting man-machine communications. And while the programs themselves might be rather compact, the fact that they remained in memory meant that any machine at which they were targeted had to have at least a little memory to burn.

"Memory is the most precious resource," David states softly, recalling one of the time-honored laws of computer science: Programs expand to fill the space available to them.

At this point in their history, the Roses had a city, a company, a computer on which to run their product. . .but no product. Two other goals still had to be met: First, David had to learn the machine, inside and out; and second, because of the scarcity at that time of programming tools for the pc, he needed to write some of his own development tools. There followed, in quick succession, an editor, a macro processor, and a print spooler.

"These were not products," David is careful to explain, "nor were they intended to be. They were first learning tools, and then development tools." With the exception of some time- and space-critical code written in assembler, these initial exercises were programmed in Pascal.

With these background projects out of the way, the Roses started getting serious about evaluating projects. As you'd expect from any company owned by two people as meticulous as David and Eileen Rose, RoseSoft's first product was very well planned—far more the product of perspiration than of inspiration (although the latter seems to have played a supporting role, at least).

Eileen, the apparent marketing maven for RoseSoft, takes over and reels off criteria that the company's first product had to meet: It had to be innovative, easy to use, and useful over a wide range of applications; and the development costs had to be reasonable. A macro processor fit the bill.

"Macros are a form of computer language," David says, "and were one of the things I had worked on extensively for NASA. So it was only natural that a macro processor would be one of the ideas that were put up against those criteria."

The macro processor won out over the other candidates, and *ProKey* was born. In the personal computer market, it was an exceptionally innovative idea. Nothing like it was then available for any personal computer. Which was both good and bad.

"Of all of our criteria," Eileen says, "the innovative one was probably misguided." She explains that the "problem" with *ProKey* is that,

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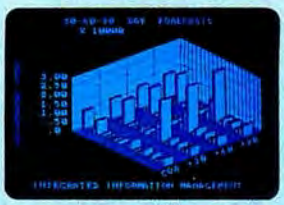

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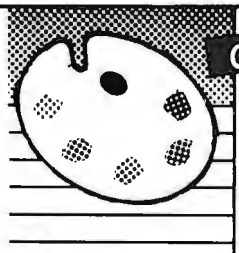

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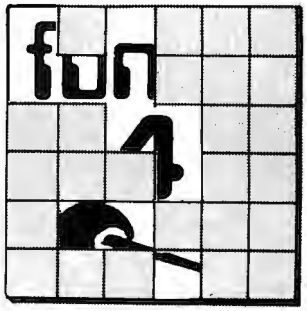

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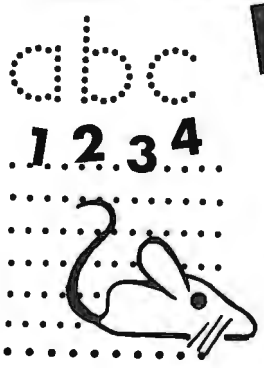

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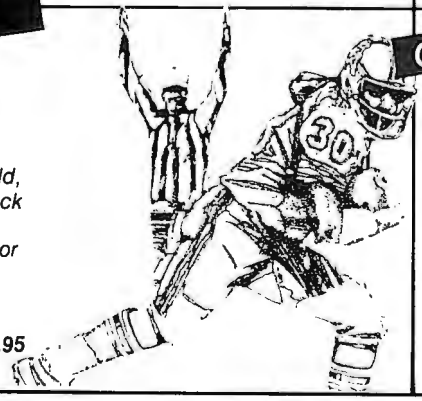

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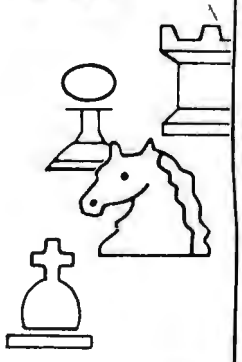

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because it is so unique, it requires a major educational effort. RoseSoft ran into problems on this score in the same way VisiCorp ran into problems when it first brought out *VisiCalc*: People were saying, "What's a spreadsheet?" Eileen observes that the educational job is proportionately bigger for a small company than for, say, a Microsoft.

The problem was exacerbated by the fact that *ProKey* is frequently billed as a keyboard enhancer. While that is certainly one of its functions, such a name fails totally to take into account its much more powerful capabilities as a macro processor. "Software enhancer" is the descriptive name that Eileen prefers, a term that is indeed more indicative of what the Roses see as *ProKey*'s central purpose: making *other* software easier to use.

"New products... will be oriented toward improving user interface."

David Rose started writing *ProKey* itself only six months after his first look at a pc, in June 1982. According to Eileen, it didn't take long to complete. A prototype version was completed in July and a final version in August. Some informal market testing took place at the Seattle IBM users' group in August.

"Alan Boyd started the pc users' group here in Seattle," David explains, "and one of the most heartening things happened when we showed it at one of their meetings: Out of a group of thirty people, twenty bought it on the spot." Since even then it was priced at fifty dollars, the Roses considered that a very good omen.

Although the unique nature of *ProKey* tended to stall early sales to unsophisticated users—they had to learn what software was, before they could think about enhancing it—it helped immensely when it came to publicizing the product. All the major pc magazines ran major reviews of *ProKey*, a fact that caused sales to jump right from the beginning. But Eileen feels that in general *ProKey* sales will tend to lag behind pc sales, since new users need to find their way around the machine before they're likely to see the need for *ProKey*.

Not that the Roses are resting on laurels. *ProKey 3.0*, the newest version, should be out by the time you read this article, and if you ply David with a few dark beers you might even get a whiff of some exciting and entirely new products.

ProKey 3.0, for example, has a lot of new features. One of those new features allows you to redefine virtually any key in any shift state, effectively allowing you to scramble your keys around as desired; Rose suggests that you might even want to move your keytops around. If you're wondering if this will allow you to put the left shift key back where it belongs—yes, you can; *ProKey 3.0* will let you swap it with the backslash or, for that matter, any other key. As you would expect from a company that specializes in the man-machine interface, reprogramming the keyboard is easy: The screen simultaneously displays before and after pictures of the keyboard, so you know where you are.

The newest version of *ProKey* also has the ability to redefine a key without losing the definition assigned to it by a program. For example, in Lotus's *1-2-3* you would be able to move the cursor functions from the keypad to the pc's function keys and still easily access *1-2-3*'s original function key assignments.

Another new feature of *ProKey 3.0*, one that will be of special value to handicapped persons, is optional sequential shift: Hit the shift key, release it, and the next key you hit will be shifted. Sequential shift works with any of the shift keys, including control and alt, and the sequential shifts are cumulative; hitting and releasing control, then alt, and then delete will reset the pc, for example.

Since the goal the Roses have set for their company is the development of products that ease the man-machine interface, it's not surprising that *ProKey 3.0* includes an improved user interface. "We found that the cursor status display that we were using, though well liked by experienced users, was too terse for beginners," he explains. "So *3.0* has a status window that tells you what's going on all the time; it can, of course, be turned off." And *ProKey 3.0* also allows bigger buffers and variable buffer size, since a few zealous users started overflowing the apparently not so ample 4K buffer available with earlier versions. With *3.0* they can ooze all the way out to 64K.

DOS 2.0 includes what is known as the ANSI escape sequence, which allows, to a limited degree, some reprogramming of the keyboard. Does David feel this will affect sales of *ProKey*?

"DOS doesn't actually offer macros," he responds. "All it really lets you do is string expansions. It doesn't offer variable fields, and it doesn't have the ability for one string to refer to another. The capabilities are really quite elementary."

David thinks that while some users might say, "Why should I spend a hundred dollars when I already have ANSI?", *ProKey*'s many extra capabilities will probably hold that segment of the market to well below 10 percent. He bases his estimate on the fact that, while newer and less sophisticated users might initially opt for ANSI over *ProKey*, "new users don't stay new users very long." That supports exactly the same point Eileen made earlier: It may take a while for a new user to learn the machine, but after he does he's liable to want to move up to *ProKey*.

And what of those new products that came up while the beer was going down? All that can be said is that they will all be oriented toward improving the user interface, since that is where David believes the greatest progress is taking place. You can pretty much figure out for yourself what areas RoseSoft's products might cover: voice recognition, telecommunications, graphics. There are mice running all over the RoseSoft digs. Think of products that extend the basic idea of *ProKey* to other areas and you're liable to know RoseSoft's next product before the Roses do. ▲

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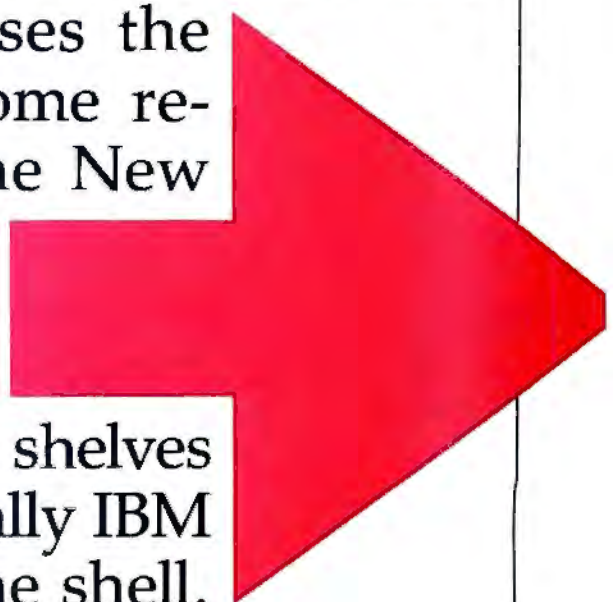
by John Socha

IBM DELIVERS!

After Prolonged Labor, Junior Arrives; Won't Be Home 'til January

IT'S 10:00 a.m., November 1, at the IBM Corporate Gallery of Science in New York City. People are milling around and waiting. Rumor has it that an Associated Press reporter is already inside. Around the corner, a television crew passes the time. A photographer and some reporters chat. And wait. At the New York Stock Exchange, investors and speculators are waiting. At 47th Street Photo, not far from the IBM Gallery of Science, shelves are empty. They too await. Finally IBM opens the door and takes off the shell.



THE NEW ARRIVAL

The Peanut, officially monikered the 'IBM PC Junior, is here at last. But don't rush out to buy one. Although PC*jr*s will be on display in stores by December, they won't be sold until the "first quarter of '84."

IBM announced two versions of the PC*jr*: an entry model priced at $669 and an expanded model to go for $1,269. You can upgrade the entry model to the expanded model by adding a disk drive ($480) and a 64K memory and display expansion board ($140).

The entry model is very similar to the cassette version of the PC introduced by IBM two years ago. While IBM never sold cables for the cassette port on the PC, they'll sell them for the PC*jr*. Clearly IBM plans to support the home (nondisk) market for the PC*jr*. To this end, IBM has added slots for two plug-in ROM cartridges similar to the cartridges found on such game computers as the Commodore VIC-20. The PC*jr* looks to be a very good game computer, in addition to being a junior PC.

Like the PC, the PC*jr* has an 8088 microprocessor, 64K of RAM, and Cassette Basic in ROM. The Expanded PC*jr* sports 128K of RAM and a single half-height, 5 1/4-inch double-sided floppy disk drive.

IBM PC*jr* COMPONENTS

System Unit

Size: width 13.9 inches, depth 11.4 inches, height 3.8 inches; weight 9 lbs. (with disk drive), 6 lbs. (without disk drive).

Power: 33 watts at 120VAC, 60Hz; external transformer, weight 2 lbs, 13 oz.

Noise: very quiet (no fan).

Processor: Intel 8088, 4.77 MHz.

Memory: 64K ROM, containing Cassette Basic, ROM BIOS, and Diagnostics; 64K RAM (entry model), 128K RAM (expanded model).

Connections: External sound, RS-232C serial port (needs adapter cable), cassette recorder (needs cables), internal modem (optional), light pen, RGB monitor (needs adapter cable), composite monitor, RF modulator (external, optional), keyboard (optional cable), two joysticks, expansion bus.

Keyboard

Length: 13.45 inches, depth 6.61 inches, height 1.02 inches; weight 25 oz. with batteries; 62 keys, with key combinations for all IBM PC keys; infrared link, 20 feet line-of-sight, or 6-foot cord.

Operating System

PC-DOS 2.1, same as PC-DOS 2.0, but with additions for new hardware on PC*jr*.

Disk Drive

5 1/4-inch, half-height, double-sided, floppy disk, compatible with IBM PC.

Display Modes

Entry model: 160 by 200 dots, 16 colors; 320 by 200 dots, 4 colors; 40 by 25 text.

Expanded model: entry-level display modes plus 320 by 200 dots, 16 colors, and 80 by 25 text.

Sound

With external amplifier or TV—3 independent voices plus white noise, 16 volume levels (28 dB range on each); internal pc-compatible speaker (one voice).

Warranty

12 months.

Running under PC-DOS 2.1, the Expanded PC*jr* uses exactly the same disks as the PC and PC-XT. This means many software packages designed for the PC will run without change on the Expanded PC*jr*. Already such software packages as the *Multiplan* spreadsheet and the *PFS:File* database run on the PC*jr*.

To the PC, the PC*jr* adds a number of new features, some transparent to application programs, others not.

The Display. An enhanced color/graphics adapter is built in to the system board. The entry model can use the forty-column text and 320-by-200-dot graphics modes (but not the eighty-column text mode) found on the PC, as well as a new 160-by-200-dot sixteen-color mode. For eighty-column text you'll need to buy the 64K memory and display expansion board, which also adds other new features to the graphics display. The Expanded PC*jr* has all the display modes found on the PC plus three additional graphics modes: 160 by 200 dots, sixteen colors; 320 by 200 dots, sixteen colors (!); and 640 by 200 dots, four colors.

These colors are not fixed. The PC*jr* contains a color map that selects any of sixteen colors for the display. That means that in the four-color mode you can pick any four of sixteen; you can even have all four colors be the same. Just program the color map for the combination of your choice. The PC was constrained to a pair of fixed four-color palettes, and the colors for these palettes weren't well chosen. There's no such limitation on the Junior.

On the PC, information for the graphics display is stored in 16K of memory beginning at location B8000 hex. This is and isn't the case on the PC*jr*. Many of the new display modes use 32K of memory, yet the PC*jr* has no memory actually residing at B8000. Instead IBM maps the Junior's display memory into its system memory. Details on this feature at the time of the announcement were scant, yet enticing.

It seems that display memory can begin at any 16K boundary of the 64K or 128K system memory. This means graphics programs can use more than one page of screen memory at a time, although doing so would reduce the amount of memory available for programs. For cartridge games, such consumption of system memory would cause no difficulty, because the program would be stored in the cartridge ROM, not in system memory. But for large DOS programs, this mapping of display memory into system RAM could pose problems. We'll know more in December, when IBM is scheduled to release the Junior's *Technical Reference* manual.

The PC*jr* won't be sold with a video display, but you can use the IBM Color Display—or any other RGB monitor—with the help of an optional adapter cord. Other cords are available for a composite monitor—most black-and-white monitors are composite monitors—or for an RF modulator. The modulator, which sends the display and sound to a normal television, is also available from IBM.

Look Ma, No Cords. Junior's keyboard has absolutely no cords. In fact, there are no physical connections between the PC*jr* and its keyboard. How's that? The keyboard uses an infrared link. It sends out bursts of infrared light to the system box. The keyboard can be up to twenty feet away from the PC*jr* and still work, provided the PC*jr* can "see" the keyboard. If you have more than one PC*jr* in a room, each machine will need an optional six-foot keyboard cable. Batteries in the keyboard should last for several months of normal use.

PC*jr*'s keyboard is somewhat smaller than the PC's and seems more like a toy than a tool. Yet, although the layout of the keyboard is very different, the same keys are there. Some of the keys, like scroll lock, are well hidden. Below the keys are small green labels with such words as *Scroll Lock* and *Break*. To "reach" these keys, you must hold down a key on the right side of the keyboard that acts as a function shift, much like the alt key on a PC. Despite these differences in the keyboard, the PC*jr* still reads the same scan codes. Even software that works directly with the hardware, as many games do, will find no difference between the PC's keyboard and PC*jr*'s.

Astounding Sound! The PC*jr* has two separate sources of sound.

Hiding under the power supply is a very small speaker that mimics the PC's speaker; this will make any program designed to use the PC's sound feel right at home. Then there's the PC*jr*'s advanced sound system.

The advanced sound system pipes its music and sound effects to the outside world through the speaker on a television set (with the help of an RF modulator) or to an external amplifier, such as the one on your stereo. And with three independent voices and noise, you can make some very rich sound effects. Each of the four sounds (three pitched voices and the white noise source) has a sixteen-level (twenty-eight-decibel) electronic volume control. This sound generator will be very popular with game designers and players.

Games on display at the IBM Gallery of Science were barely hinting at the possibilities. One program played the *William Tell* Overture with three voices—very charming. Another program produced realistic-sounding explosions; you can't do that with a stock PC.

Joysticks. The requisite adapter for two joysticks with buttons is built into the system board of the PC*jr*. And the optional joystick, sold by IBM, looks suspiciously like the Kraft joystick, even down to the switch to turn the spring tension on and off. This should be a very popular addition for game players.

ROM Cartridges. Several games are already available for the PC*jr* in ROM form. These ROM cartridges can contain programs up to 64K or, with two cartridges, 128K in length. This is enough room for some very sophisticated programs.

One ROM cartridge extends the power of Basic in the entry model PC*jr*. Some of the programs announced as available for the PC*jr* require both this Basic cartridge and DOS 2.1, so it seems that cartridges can be used with DOS programs. What does this mean? It means that cartridges may soon appear for programs such as *VisiCalc* or *WordStar*; the cartridge format would leave the 128K of system RAM free for user data.

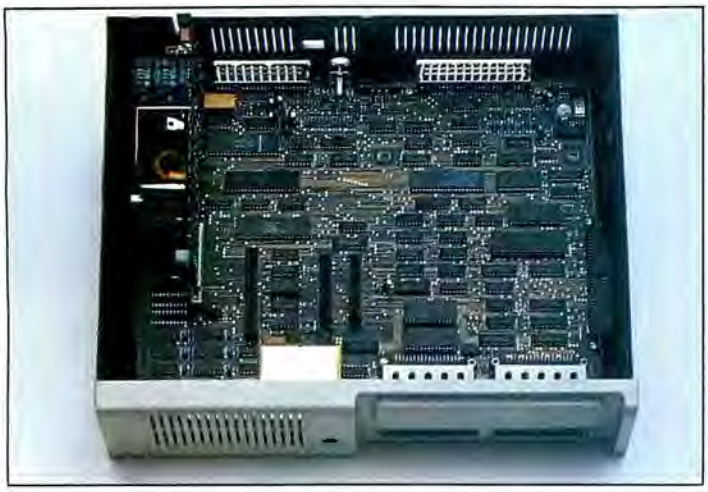
The sky's the limit when outside vendors bring their imagination to bear on the PC*jr*. But what about expansion in other places?

Bringing Up Junior. At the announcement, IBM was very quiet about the expandability of the PC*jr*, but expandable it is. Inside the Junior's compact system unit are three sockets for expansion boards (see photos, page 48). Unfortunately these three are spoken for already.

The leftmost socket is for the aforementioned 64K memory and display expansion board. Although the socket is spoken for, just wait for Quadram and other board companies to get their hands on the PC*jr*. They may find ways to stuff additional functions onto this board. There's certainly room for more functions.

To its right is another socket reserved for a 300-baud modem built by "an unspecified manufacturer." IBM was proudly showing the interior of a PC*jr* equipped with the modem board, and small, white letters on the side of this board read "Novation," which, coincidentally, is the name of a well-known modem manufacturer.

Finally, the rightmost slot contains the disk controller found in the Expanded PC*jr*.



Two views of the inner peanut; the entry model, left, and the expanded model. Note the three slots in the entry model (they're obscured by the disk controller in the expanded model). The Junior uses an external transformer, so there's no bulky power supply inside; there's also no fan and no 8087 socket.

Is that it? Nope. If you look carefully at the inside view of the Entry PC*jr*, as shown in the photos on this page, you'll see a connector on the right side, near the cartridge slots. The right side of the Junior has a removable plastic panel where modules can be attached. These modules are small, metal boxes that plug into the side. At present, IBM offers only the parallel printer adapter. But who knows what else may become available? Moreover, there's a second connector on the right side of the parallel printer module, which suggests the possibility of piggybacked add-ons.

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Expect board manufacturers to add more power to the PC*jr* by building add-on modules. Since all the same signals appear on the module connector, plus a few more, there won't be anything holding back board manufacturers. The PC*jr* really is expandable. What's the limit? The power supply. But, of course, modules could have their own power supplies. The next several months will be very interesting. Who will be the first to offer a multifunction card for the Junior?

Odds and Ends. Also included in the PC*jr* is a serial port with some rather odd specs. The serial port in the PC can send and receive at rates up to 9600 baud. Don't laugh now—the PC*jr* can send at 4800 baud and receive at 1200. No, that's not a misprint. They saved some circuitry by building a serial port with those specs. The send rate of 4800 baud is convenient for a serial printer, while 1200 baud is enough for a fast modem. After all, most people can't read fast enough to keep up with 1200 baud (120 characters per second, or about fifteen hundred words per minute). This serial port acts as the PC*jr*'s Com2.

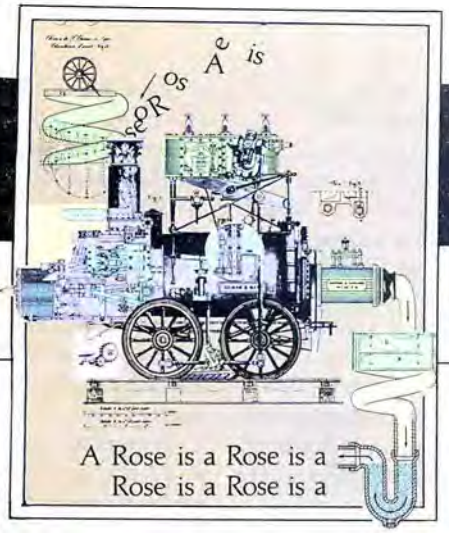
With all the improvements and changes in the PC*jr*, IBM has strived to keep hardware compatibility with a stock PC. In the case of the keyboard, the signals are very different. Infrared signals travel from the keyboard to the system box where they send an interrupt to the 8088's nonmaskable interrupt line. Each keypress on the PC*jr* sends a short series of pulses (up to eleven) to the 8088, and each of these pulses interrupts the 8088. The new ROM BIOS routines decode these pulse groups and convert them into the proper scan code. Then, to provide compatibility with the PC, the Junior puts the scan code into an I/O port located at 60 hex, so any software written to read the PC hardware directly will function identically on the PC*jr*. This should give you an idea of the lengths IBM went to just to preserve compatibility.

How is the PC*jr* junior to the PC? Mainly in terms of expandability and keyboard. The Junior lacks the PC's expansion slots, and although it has as much room for expansion through the expansion modules, these modules will be expensive, because they must be in metal cases. And the keyboard, on first appearance, seems inadequate for professional use. We'll know for sure if that's the case after we've put some mileage on one.

Aside from these two complaints, the PC*jr* looks very strong. As long as you don't mind giving up the sharp-charactered monochrome display, the PC*jr* should prove a very satisfactory home machine. Better than an Apple II or IIe. The Apple II is the best computer for game lovers. That should change as game writers begin to tap the added power of a PC*jr*.

And if you just want to take some work home, Junior has the PC's disk format and operating system. It suffers merely from stunted memory growth—and that only for now. ▲

THE PROCESSED WORD



by Terry Tinsley Datz and F. Lloyd Datz

PeachText 5000

PeachText 5000, PeachTree's integrated software package, sounds too good to be true: a combination word processor, spelling checker, on-line thesaurus, mailing list program, and spreadsheet for less than $400. What's the catch, you ask?

The catch is that, taken individually, none of these programs shines bright. In fact, if you do full-time word processing, *PeachText* will probably disappoint you with the way it handles text entry and on-screen formatting. But, if you're looking for an inexpensive means of using the pc for a variety of applications, you'll find that *PeachText 5000* can do just about everything but pay your bills—and for that you can add one of Peachtree's accounting programs.

Overall Design. *PeachText 5000* belongs to Peachtree's Office Productivity Series, a group of programs that can share data. In addition to the five programs that come with *PeachText 5000*, you can add a telecommunications package, a scheduling program, and a project management system as options. As a bonus, for only $10 *PeachText 5000* customers can purchase Peachtree's *Access Pak*, a program that links the Productivity Series to Peachtree's accounting packages.

The word processing program—logically enough, called *PeachText*—is *PeachText 5000*'s core. (Or, should we say, the pit?) You can gain access to the thesaurus directly from *PeachText*'s editor, while you select the spelling checker, list manager, and spreadsheet from the program's main menu. Unless you have a hard disk, switching between programs usually requires swapping disks, since the programs are supplied on separate floppies.

***PeachText* Word Processor.** *PeachText* is a spin-off of *Magic Wand*, one of the original word processors written for the CP/M operating system. When Peachtree modified *PeachText* for the IBM, they created two versions. One was redesigned specifically for the pc and is now sold under the IBM logo. The second version, the one included with *PeachText 5000*, differs only slightly, mainly because it's intended to work with some of the pc lookalikes. As a result, it lacks IBM-specifics like the handy screen indicators that tell you when you've engaged the caps lock or num lock key, and it doesn't support the IBM dot-matrix printer's expanded character fonts. Otherwise, the two versions differ only in that the one distributed by IBM has flashier screens and sells for considerably more.

Text Entry and Editing. When you enter the editing mode, the program shows a status screen that lists the name of the file you're editing, the amount of memory available (expressed both in total characters and as a percentage of memory used), the document type (text or program), current tab settings, and the line width of the screen display. You then press return to get to the text entry screen.

The text entry screen isn't just uncluttered—it's completely bare, without even the customary ruler or status line to guide you. Navigating through your document without knowing the page, line, or column position of the cursor can be a challenge—like sailing across the Atlantic without a sextant.

Controlling the cursor isn't much easier. Not only are your options limited, but, other than the arrow keys (which perform as you'd expect), the key choices don't make sense. The page up, page down, and end keys aren't used at all, while the home key does triple duty, taking you to the beginning of the current line with the first press, and back and forth between the top and bottom of the screen with succeeding presses. Control-T and control-B take you to the beginning and end of the document, and F1 and F2 control vertical scrolling by line and by the screen. Unfortunately, that's all there is. Moving by word, sentence, or paragraph, not to mention jumping to a specific page number, just isn't possible. Of course, since page numbers aren't displayed, jumping to a specific page would be impossible anyway.

You insert material in two ways. Press the insert key to insert just a few characters; everything in front of the cursor pushes ahead as you enter text. Or, to insert large blocks, hit F8 and the text splits at the point of the cursor, leaving one line displayed at the bottom of the screen for continuity. After you've finished inserting, hit F8 again to close the gap. Unfortunately, when you use the insert key you get no on-screen reminder that you're in insert mode. To make things worse, hitting any other function key (such as control, backspace, or tab) cancels insertion and puts you back in overstrike mode. If you're not careful, you'll wind up typing over valuable text.

Logically, *PeachText* uses the delete key to erase the character under the cursor and the backspace key to delete the character to the left. But, not so logically, when you use the backspace key to remove several words, you're stopped at the left margin. This makes it impossible to back up to the line above to continue deleting. And, stranger still, you can't use the delete key to remove a carriage return. In fact, the only way to get rid of an unwanted return is with the line delete command.

The F4 key deletes by word, and F9 deletes from the cursor position to the end of the line. As a safety measure, however, you have to press F9 twice before anything happens. The program doesn't highlight the words to be deleted nor does it remind you to press F9 again—it just stubbornly waits for a second F9. Although safety features are usually appreciated, this one seems like overkill. William Faulkner might have been devastated by the loss of a few words, but most of us would just as soon skip the extra keystroke. Ironically, this safety feature works only on the first line you delete; you can erase as many additional lines as you want without pressing F9 more than once per line.

Manipulating blocks of text can also be irritating. Marking the beginning and end of the segment is easy enough: Just press F3 and an underscore character appears as a block marker. However, the same symbol is used to designate text to be underlined, so it's sometimes impossible to tell how many markers you've inserted. Complicating things still more, the program won't allow more than two block markers in the text at any one time, but it doesn't give you an error message until you ac-

tually attempt to manipulate the block.

Once you've marked the block, you press escape and leave the text-entry screen to return to the editor's status screen. At the bottom of this screen you type a two-letter code to indicate whether you want to move, copy, or delete the segment. Since the markers disappear as soon as the operation is complete, there's no easy way to determine if everything went as planned. And although you're asked to confirm your deletion, you can't retrieve it if you change your mind.

To activate the search-and-replace functions, you press F6. The program displays a colon at the bottom of the screen without any other prompts such as the traditional, "Search for?" Nor is this function particularly powerful. When you tell the program which word to look for, you have to insert spaces on either side of it and resign yourself to missing occurrences set off by punctuation, because whole words can't be differentiated. Capitalization can't be ignored, so words occurring at the beginning of sentences will also be missed unless you do a separate search. In addition, the program won't search backward.

Another limitation of the editor is its inability to handle columns of numbers or text. There's no separate mode for moving columns, and you can't scroll horizontally beyond 80 columns, although you can print up to 132 columns if your printer has the capability.

Formatting and Printing. *PeachText* is definitely not screen-oriented: You can't see page breaks, double-spacing, or right-justified margins on screen while you're editing. To get an idea of what your document will look like when printed, you have to "print" it to the screen instead of to the printer. In some cases what you see on the screen still doesn't correspond to the printed page. For example, *PeachText* indicates boldfacing by displaying each letter twice and underlining by inserting an extra line of multiple dashes beneath the words to be underlined.

Printing to the screen does allow you to see page breaks. Unfortunately, if you spot any page breaks falling at inopportune places, you have to return to the editor to correct them. Then, you have to print to the screen again, since changing one page will affect any breaks that follow. With long documents, this process turns out to be a major undertaking.

Fortunately, you can control page breaks by inserting a conditional page command at the beginning of your document. For example, if you type *CNP2*, the program will not break a paragraph at the bottom of the page until the paragraph is more than two lines long. A related command keeps lists and tables intact on one page. For instance, to keep a table of eight lines from being split between two pages, you can embed the command *IF%LINES<8,NP* on the line preceding the table.

Headers and footers can be of unlimited length. Through a complex sequence of commands, you can have them print alternately on the left and right edges of consecutive pages. Curiously, in order to prevent footers from automatically starting on the line immediately following the main text, you have to enter an extra command to insert a blank line.

Automatic footnoting isn't supported, but you can insert footnotes at print time by stopping the printer on the appropriate pages.

PeachText does not provide hyphen-help. You can, however, insert conditional hyphens (also called ghost hyphens) in multisyllable words that you anticipate may need dividing. Instead of using a hyphen as you'd think, however, you insert an ampersand at the point where you want the word divided. At print time, *PeachText* checks each word that won't fit onto the end of a line to see if you've inserted a conditional hyphen. If you have, it substitutes a real hyphen for the ampersand and divides the word. Oddly, though, the program treats words with naturally occurring hyphens (like mother-in-law) as single words, keeping them together on a line at all costs unless you add an ampersand.

PeachText gives you two ways to set up your document's format. You can either embed nonprinting commands directly in the text, or you can wait until print time and change the default values on the print screen. You embed individual commands by typing a reverse slash followed by a two-character code. For example, to set a top margin of five lines, you would type *\TM 5*. If you then decided to reduce the top margin to four lines, you would type the command *\TM−1*.

At print time, any formatting commands you've already embedded within your document will be reflected in the print screen. By typing a two- or three-letter abbreviation from the formatting table of values, you can make further changes or even override any commands you've already embedded. This setup makes it easy to print multiple copies of a document, using a different format each time.

Special printing features are well supported. Underlining can be either continuous or broken between words, and you can vary the intensity of boldfaced text by having the printer strike the paper up to nine additional times. Proportional spacing is also possible if your printer can do it.

File Handling. The file directory displays filenames in the usual PC-DOS format by using eight characters plus an optional three-character extension. Unlike most other word processors, however, *PeachText* allows you to list the file directory and even view the con-

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tents of another file without leaving the editor. This feature is especially handy for boilerplating, since it helps you locate the appropriate text to merge.

When you finish editing a document and save it to disk, the program automatically makes a backup copy by saving the previously edited version with the appended suffix .bak. You can also save your work without leaving the editor, but the file thus saved is only temporary and can be lost if you're not careful.

PeachText doesn't do automatic disk buffering, so your documents are limited to about twenty-five double-spaced pages. There is a way to edit longer documents, however, by issuing commands to alternately read and write portions of the file to and from disk. This shuffling technique is probably acceptable for an occasional document over twenty-five pages, but you wouldn't want to do it every day.

Document assembly is definitely *PeachText*'s forte. Several file-merging commands make it simple to include one file within another or to insert boilerplate paragraphs with just a few keystrokes. To boilerplate, you create a file of standard paragraphs and assign each paragraph a code number (like A-1, A-2, and so on). Then, when you want to insert one of the paragraphs into a document, you type *I* and follow it with the appropriate filename and code number for the boilerplate text.

You can also enter information from the keyboard into your file at print time. If you're sending the same letter to several different people, you can insert a *Get* command where the name and address go. Every time the letter prints, the program stops the printer and waits for you to type in the appropriate information.

PeachText offers you many variations in form-lettering. Once you set up your data file, using either *PeachText* itself or *List Manager* (as we'll see later on), you have a powerful set of logic commands at your disposal. These commands do take some getting used to, however, since they work a lot like a primitive programming language. For example, if you wanted to send letters only to those people in your data file who live in Chicago, you would use the conditional command:

IF NOT CITY= "Chicago", END.

Or, when sending out letters to overdue accounts receivable, you can use a similar command to print different letters based on how far behind each account is in its payments.

You can also merge *WordStar, EasyWriter,* and *VisiCalc* files by using a set of accessory programs (called *Access Pak*) available from Peachtree. These programs translate the files into the proper format for *PeachText* or *PeachCalc*, convert all embedded commands into their *PeachText* equivalents, and display any unresolved differences on screen.

Spelling Proofreader. *PeachText 5000* bases its spelling checker on a dictionary of twenty-thousand words—a bare minimum. To use it, you type *SP* from *PeachText*'s main menu. From its own menu, *Spelling Proofreader* gives you several choices: checking a document, altering the dictionary, creating a new dictionary, changing the default settings that determine how the program operates, asking for help, or returning to *PeachText*.

As the program proofreads your document, it provides a running tally of the number of words checked, the percentage that are unique, and the number and percentage that it can't match with words in its dictionary. You hit return to begin reviewing the unmatched words individually at the bottom of the screen (not in context, however). As you look at each word, you can either add it to the dictionary, accept it as correct, or mark it for later correction. If you choose the marking option, the program substitutes a bracket for the last letter in the word. It's then up to you to return to *PeachText* and use the search function to find all the marked words and correct them.

Instead of reviewing the words *Spelling Proofreader* couldn't match with its dictionary individually, you can handle them as a group. This way you can view the whole list at once and sometimes make one decision for all of them. (Obviously, you first have to be sure that each word requires the same action.) For example, if all the words in the list are misspelled, you can have them all marked with brackets. If they are not misspelled but just not in the dictionary, you can add them collectively to *Spelling Proofreader*'s dictionary.

The amount of space on the *Spelling Proofreader* disk limits the number of words you can add to the dictionary; with a hard disk, this number is just about limitless. You can also create supplemental dictionaries for professional or technical terms that aren't in the main dictionary. By changing the values in the default table, you can specify which dictionary is used to proof your documents.

Spelling Proofreader does have several shortcomings. Many spelling checkers can go into your document file and automatically find and change misspelled words once you supply the correct spelling. Some even suggest the correct spelling for unmatched words. *Spelling Proofreader* does neither. Having to return to the word processor to correct all the flagged words—not to mention looking up all the correct spellings in a print dictionary—slows you down considerably. A minor irritation is that *PeachText*'s embedded commands for text formatting aren't in *Spelling Proofreader*'s dictionary and will be flagged unless you add them to the dictionary yourself.

Random House Electronic Thesaurus. The *Random House Thesaurus,* Peachtree style, gives you access to forty-four hundred keywords and slightly more than twenty-six thousand synonyms—all this without your ever having to leave the keyboard to thumb through your pocket thesaurus.

Using the thesaurus is as simple as placing the cursor over the word you want help with, swapping disks (if you don't have a copy of the thesaurus on your *PeachText* disk), and pressing F10. On the lower portion of the screen, separated from the main text by dashes, a list of synonyms appears, including the original word marked with brackets. You use the right arrow key to position the brackets around the synonym that you want to use and then hit return: The new word will replace the old one and will be matched for case. If you decide not to use any of the synonyms listed, you press escape to return to editing.

This procedure is straightforward enough —unless the word you want to replace isn't among the program's keywords. Unfortunately, this is a common occurrence, since the keywords are mostly root forms, not plurals or past tenses. For example, if you're looking for a synonym for *earned*, the program will tell you it can't find *earned* and will display alphabetically neighboring words such as *earn*. If you were using your pocket thesaurus, you'd just look at the synonyms for *earn* and add *ed* to the one you wanted to use. With the *RH Electronic Thesaurus*, looking up synonyms for the alternative word (in this case, *earn*) isn't so easy: You have to press escape to go back to the editor, change the word to *earn* in the main text, put the cursor back at the beginning of the word, and press F10 again to reactivate the thesaurus.

Interestingly, *WordStar*'s version of the *RH Electronic Thesaurus* that runs under CP/M doesn't share this problem but lets you look up synonyms for the alternative words without your having to insert them in your text.

List Manager. *List Manager* (available separately under the IBM logo) primarily maintains address files; it's also powerful enough to use for simple database management.

To create a data file, you can define as many as fourteen fields per record, with up to 509 characters in each field. This process is simple: The program supplies a blank form with the fields numbered from one to fourteen along the left side of the screen. By using the special function keys to move between the fields, you indicate what each field is to contain by typing *name, address,* and so on, followed by the number of characters you want reserved for that field (for example, thirty characters for *name*).

If you decide to change one or more of the fields or add a new field for additional information, you can easily redefine the existing file. You can also preset values that are common to each record and save yourself a lot of typing. For example, if you were assembling a list of club members from the same city, you

could have the program automatically fill in the city and state portion of the address.

When you define the data file, you can indicate how you want it indexed. For instance, if you know that you'll usually be looking up records by last name, you would specify that field as the primary index. In addition, you can define two cross indexes, like Zip Code or membership number, to give you additional ways to gain access to individual records quickly. Since the program catalogues the file on the basis of this information, you don't have to wait for it to do a sort every time you look something up or request a printout.

List Manager gives you a lot of flexibility in designing the format for printing your data file. You can define up to fourteen different formats for each file, so it's easy to get varying formats for different uses (such as mailing labels versus printed membership lists). There's also a test print feature that's especially nice when you're printing mailing labels. Once you've set your format, you can do a quick print of one or two records to make sure that your settings are okay before carving them in stone.

But *List Manager* can do more than just manage your mailing lists. With its built-in logic commands, it can act like a database management system. For instance, you could have it find all the members in your club who have an interest in bird watching and have contributed over $100 in the last year. This information could then be used with *PeachText* to generate form letters requesting donations for a new bird sanctuary.

PeachCalc. *PeachText 5000*'s fifth slice is *PeachCalc*, a spreadsheet program. We didn't evaluate this program in-depth—after all, we're word processors, not sheet spreaders—but, briefly the program's design is similar to *VisiCalc* and its clones. Worksheets can have up to 254 rows and sixty-three columns, with variable column widths from 0 to 126 characters, and can occupy a maximum of 256K of RAM. You can add, subtract, multiply, and divide, as well as find partial sums, minimums, maximums, square roots, and trig functions.

To enter commands, you press / and a menu of command choices (each represented by a single letter) appears. To load a worksheet, for instance, you type */L* (sound familiar?) If you need help, you can get it from any point in the program by pressing the question mark key. In addition, PeachTree offers a separate graphics program that allows you to create eleven different types of graphs from *PeachCalc* data.

Documentation and Support. *PeachText 5000*'s documentation consists of two spiral-bound notebooks, one a 207-page tutorial and the other a 224-page reference manual. Peachtree hasn't wasted any paper—the top and bottom margins are narrow and the print is tightly packed on the page.

The tutorials cover each of the five programs thoroughly, and, what's more, they're even fun to do. To learn the word processor, you help Abraham Lincoln edit the Gettysburg Address. (He starts out with, "It's great to be here in Pennsylvania. . .") Then, to learn boilerplating, you help him answer his mail by sending canned responses to schoolchildren, influential supporters, and threatening citizens. Each tutorial gives you sample files on disk so you don't waste time typing in long segments of text. Even so, plan on spending several days to go through all five programs.

The reference manual is filled with detailed information, and even helpful hints, such as what to do about paper slippage in your printer—if you could only find what you're looking for when you needed it. The reference manual has no index and only the skeleton of a table of contents. Worse yet, within chapters, information is organized alphabetically instead of by subject. As a result, it's hard to get an understanding of just what the program will and won't do. In fact, some useful commands (the conditional paging command, for one) are so well hidden that you sometimes find out about them by accident, usually when you're looking for something else.

Peachtree provides free program support for thirty days but charges $96 per year thereafter for access to a hot line, user newsletter, bug fixes, and upgrades at a nominal cost. The disks aren't copy-protected.

Ease of Learning. You won't have any trouble learning any of these five programs; they're all menu-driven and provide plenty of on-screen help. Still, you shouldn't expect to master all five of them at one sitting. If you've got the time, the best strategy is to go through the exercises in each of the tutorials. You won't learn everything there is to know about the package, but you'll get a good overview of it.

Summary. In an office environment where the pc is used for a variety of applications, *PeachText 5000* can give a lot of mileage for your dollar. The word processor itself is probably best suited for form letters and other short- to medium-length documents.

System Requirements. 128K of RAM and two disk drives. Printers supported include C. Itoh Starwriter, Diablo 630, NEC (3550, 5510, 5520, 5530, 7710, 7715), Qume Sprint (9 and 11). ▲

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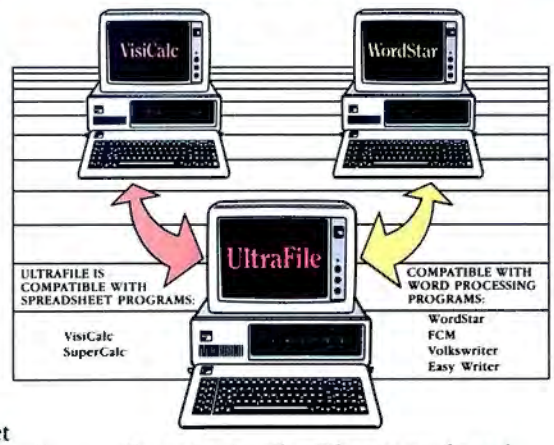

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THE BASIC ASSEMBLY LINE

CATCHING FILENAME ERRORS

BY HOWARD GLOSSER

As you may have discovered, Basic can be very unforgiving when it comes to handling filenames. If, for instance, you specify an invalid drive letter in a Basic statement, the system defaults to the last active drive. If that isn't what you intended to do, the resulting unnecessary action (accessing the wrong drive), will cause a "File not found" message to be issued.

Basic is capable of handling several types of filename errors. Here are several examples of correct and erroneous filenames that might be used in a Basic program, with the results corresponding to each.

Filename	Result
B:NAME1.EXT	File is opened and accessed normally
A:	Error message 53—File not found
B:ABCDEFGHI.EXT	Error message 52—Bad file number
X:NAME2.EXT	Basic accesses last active drive
B:[XXX.XX	Error message 53—File not found (drive is not even searched)

As you can see, Basic traps just about all these filename errors, and consequently a program can recognize that they have occurred by using the *err* and *erl* functions. Still, everything considered, catching almost all the errors is not as good as catching all the errors. That's where this month's subroutine comes in.

Our program, Validate, is designed to edit a filename that will be used in a Basic program. It catches all the previously mentioned errors as well as adding a couple of extra touches itself. Validate is an assembly language subroutine that's built from *data* statements in a Basic program.

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Creating Validate. The program shown in figure 1 builds the Validate subroutine. It begins by pointing to Basic's data segment with the *def seg* in line 130. Next, the string Subrt$ is defined as a length of 160 characters and is set to blanks. This is where the subroutine resides. Line 150 retrieves the string descriptor for Subrt$, and line 160 finds the actual memory location of the contents of the string.

Since this subroutine is longer than those we've worked with previously, it is designed in such a way that, if you make a mistake while typing the *data* statements (a tedious chore to be sure), the program will tell you which line contains the typo. This will spare you the hassle of searching through twenty lines for an elusive error. You'll note that at the last entry in each *data* statement is a two-byte hex value. This value is the checksum (accumulated sum) of the hex characters located on each *data* line. As the values are poked into memory, they are added to an accumulator. Every ninth time, this value is compared with the checksum. If the values don't match, a tone sounds, the message contained in line 410 is displayed, and the program stops.

The code starting at line 210 keeps track of the line numbers of your *data* statements. The variable Lineno% has an initial value of 450, which is the line number of the first *data* statement. This value then is incremented by 10 as each *data* line is read. This is how the program knows which line contains a data error.

If the checksum balances for each line of data, line 370 saves the subroutine to disk under the name Validate. Once it's saved, the subroutine can be used by any Basic program. Now let's see what it can do.

Putting Validate to Work. The program in figure 2 demonstrates the Validate subroutine. Line 60's *def seg* points to Basic's *data* segment. Following this, string Subrt$ is defined again. Note, however, that the string is only 156 characters long here, as opposed to 160 in figure 1. The difference in length is due to the checksum used to build the subroutine. For the checksum to work properly, the *data* lines have to be of equal length. Consequently, some fill values (&H00) are added to the last *data* line in figure 1. Since these are of no use in the actual operation of the program, only 156 (&H9C) of the 160 bytes are actually saved on disk with the *bsave*.

Line 80 retrieves the string descriptor for Subrt$, and line 90 does a *gosub* to the routine at line 400. This routine acquires the actual loca-

```
10 ' ***** BUILD VALIDATE SUBROUTINE *****
20 '
30 '  This subroutine will validate
40 '    file names input on the screen
50 '
60 '  WRITTEN BY HOWARD GLOSSER
70 '
80 CLS
90 PRINT "Creating VALIDATE Subroutine. . ."
100 '
110 ' ** THIS SETS UP STRING LOCATION FOR SUBROUTINE
120 '
130 DEF SEG
140 SUBRT$=STRING$(160,32)
150 SUBLC%=VARPTR(SUBRT$)
160 VALID=PEEK(SUBLC% + 1) + PEEK(SUBLC% + 2) * 256
170 LCN=VALID
180 '
190 ' ** THIS BUILDS THE SUBROUTINE
200 '
210 LINENO%=450
220 FOR STMT = 1 TO 20
230   FOR MEM = 1 TO 8
240     READ DT%
250     POKE LCN,DT%
260     CHECKSUM%=CHECKSUM% + DT%
270     LCN=LCN + 1
280   NEXT
290   READ DT%
300   IF CHECKSUM% <> DT% THEN 410
310   LINENO%=LINENO% + 10
320   CHECKSUM%=0
330 NEXT
340 '
350 ' ** THIS SAVES THE SUBROUTINE
360 '
370 BSAVE "VALIDATE",VALID,&H9C
380 PRINT "VALIDATE SUBROUTINE CREATED"
390 END
400 '
410 BEEP:PRINT "ERROR in DATA STATEMENT - Check line " LINENO%:END
420 '
430 ' ** DATA STATEMENTS TO BUILD SUBROUTINE
440 '
450 DATA &HEB,&H03,&H90,&H00,&H00,&H55,&H8B,&HEC,&H034A
460 DATA &H8B,&H5E,&H0A,&H8B,&H77,&H01,&H8B,&H5E,&H02DF
470 DATA &H08,&H8B,&H7F,&H01,&H2E,&HC7,&H06,&H03,&H0211
480 DATA &H01,&H00,&H00,&H56,&HB0,&H0F,&HB4,&H29,&H01F3
490 DATA &HCD,&H21,&H5E,&H3C,&H01,&H75,&H07,&H2E,&H0233
500 DATA &H81,&H0E,&H03,&H01,&H01,&H00,&H80,&H7C,&H0190
510 DATA &H01,&H3A,&H75,&H0E,&H83,&HC6,&H02,&H3C,&H0245
520 DATA &HFF,&H75,&H07,&H2E,&H81,&H0E,&H03,&H01,&H023C
530 DATA &H02,&H00,&H80,&H7D,&H01,&H20,&H75,&H0A,&H019F
540 DATA &H2E,&H81,&H0E,&H03,&H01,&H04,&H00,&HEB,&H01B0
550 DATA &H3E,&H90,&HB0,&H2E,&HB9,&H09,&H00,&H38,&H02A6
560 DATA &H04,&H74,&H12,&H80,&H3C,&H20,&H74,&H28,&H0202
570 DATA &H46,&HE2,&HF4,&H2E,&H81,&H0E,&H03,&H01,&H02DD
580 DATA &H04,&H00,&HEB,&H23,&H90,&H46,&HB0,&H20,&H02B8
590 DATA &HB9,&H04,&H00,&H38,&H04,&H74,&H18,&H38,&H01BD
600 DATA &H04,&H74,&H14,&H46,&HE2,&HF9,&H2E,&H81,&H035C
610 DATA &H0E,&H03,&H01,&H04,&H00,&HEB,&H08,&H90,&H0199
620 DATA &H2E,&H81,&H0E,&H03,&H01,&H08,&H00,&H8B,&H0154
630 DATA &H7E,&H06,&H2E,&HA1,&H03,&H01,&H89,&H05,&H01E5
640 DATA &H5D,&HCA,&H06,&H00,&H00,&H00,&H00,&H00,&H012D
```

Figure 1.

```
10 ' ***** THIS PROGRAM DEMONSTRATES THE VALIDATE SUBROUTINE *****
20 '
30 '  **** STORE VALIDATE SUBROUTINE IN STRING
40 '
50 KEY OFF
60 DEF SEG
70 SUBRT$=STRING$(156,32)
80 SUBLC%=VARPTR(SUBRT$)
90 GOSUB 400          ' get subroutine location
100 BLOAD "VALIDATE",VALID
110 '
120 '  ** ASK FOR FILENAME
130 '
140 CLS
150 WORK$=STRING$(16,32)
160 RETCD%=0:ERRCD%=0
170 LOCATE 1,15:PRINT "**** DEMONSTRATE VALIDATE SUBROUTINE ****
180 LOCATE 3,10:INPUT "Filename is ",NM$ : NM$ = NM$ + " "
190 '
200 '  ** CALL TO VALIDATE SUBROUTINE
210 '
220 GOSUB 390
230 CALL VALID (NM$,WORK$,RETCD%)
240 '
250 '  ** DISPLAY RESULT OF VALIDATE
260 '
270 LOCATE 5,1
280 PRINT "Result of VALIDATE is. . .":PRINT
290 IF (RETCD% AND 1) = 1 THEN PRINT "   Code 1 - Global name"
300 IF (RETCD% AND 2) = 2 THEN PRINT "   Code 2 - Invalid drive":ERRCD%=1
310 IF (RETCD% AND 4) = 4 THEN PRINT "   Code 4 - Invalid filename":ERRCD%=1
320 IF (RETCD% AND 8) = 8 THEN PRINT "   Code 8 - No extension"
330 IF ERRCD%=0 THEN PRINT SPC(12) "Filename checks out ok!"
340 IF ERRCD%=0 THEN SOUND 500,1:SOUND 400,1 ELSE SOUND 50,7
350 PRINT:PRINT "Press SPACE BAR to continue or (S) to Stop "
360 CN$=INKEY$:IF CN$="" THEN 360
370 IF CN$="S" OR CN$="s" THEN END
380 GOTO 140
390 '
400 '  ** RETRIEVE LOCATION OF SUBROUTINE
410 '
420 VALID=PEEK(SUBLC% + 1) + PEEK(SUBLC% + 2) * 256
430 RETURN
```

Figure 2.

25 Mb the hard way.
25 Mb the Rana way.

tion of Subrt$. As we learned last month, this location is subject to change without notice if Basic decides to do housecleaning. Therefore, to assure that the current location of the subrnutine always is known, the routine on line 400 is run prior to each call to Validate. The subroutine is actually loaded by the *bload* in line 100.

A work area, Work$, with a length of sixteen characters, is defined on line 150. This area is used internally by the subroutine and will be explained fully in the assembly section of this article. One other variable necessary to the operation of Validate is Retcd%, an integer variable defined in line 160. After a call to the subroutine, Retcd% may contain any combination of the following return codes.

Value	Definition
0	None of the below conditions occurred
1	Filename contains global characters (? or *)
2	Invalid drive letter
4	Invalid filename
8	Filename has no extension

Return codes 2 and 4 are error messages, whereas return codes 1 and 8 are the "extra touch" mentioned earlier. Sometimes you want to know if a filename contains global characters or if no extension has been specified so you can supply your own default. Validate will give you all this information via Retcd%.

The *and* Operator. Since the value in the return code could be any combination of the above, we need to have a way to separate them logically. Lines 290 through 320 use the *and* operator to do this. The *and* operator works at the bit level of a number, and here it's used to mask out all but the bit currently being checked in Retcd%. Any bit that is *and*ed with a 0 will result in a 0, and any bit *and*ed with a 1 keeps its previous value. The following example illustrates this.

	Decimal	Binary
Number	9	0000 1001
is anded with	8	0000 1000
resulting in	8	0000 1000

Thus if the value of Retcd% is 9 (indicating a global name and no extension), this could be broken down into 8 and 1 by *and*ing Retcd% with those values respectively. If the filename checks out all right after the subroutine call, the message on line 330 is displayed.

This demonstration can run as many times as desired, substituting a different drive letter and filename combination each time. Just for starters, try using the filenames listed at the start of this article and see what results you get.

In the demonstration, the results of the validation are simply displayed on screen. In a real application, however, it would be up to you to decide how to handle the information in Retcd%. Also, it probably would be best to use the Ckkey subroutine from the April 1983 *Softalk* (page 125) in place of the *input* statement in line 180. This would afford more control in the entering of the filename before you called Validate to check it.

Now that the demonstration is behind us, let's take a peek at the assembly routine itself.

Parsing a Filename. The listing in figure 3 is the commented assembly program. Since it's fairly self-explanatory, we'll just cover the highlights.

To start with, the filename and work area are retrieved from the stack, a two-byte variable Retcd is set up to hold the return code, and the AX register is set up to do a parse function call (29H). The word "parse" basically means "to break something down into its parts." Before the program does this call, the ES:SI registers must be pointing at the line to be parsed (in this case the filename) and the ES:DI registers must point at an area where an unopened file control block (FCB) will be located. This is where the work area (Work$) comes in and the FCB is built. Setting register AL to 0FH indicates to the system that the drive, filename, and extension supplied in the filename are to be placed into the FCB area.

After the interrupt 21H in line 30, ES:DI points to this FCB. By examining register AL we learn the following:

If AL is 01, the filename contains global characters
If AL is FF, the drive letter is invalid

In addition, if the filename is invalid, ES:DI+1 will contain a blank. So far we've covered three of the four return codes. But there's more work to do. Lines 47 through 71 check the filename for proper length and extension. Surprisingly, it appears that the parse call doesn't do this. If a filename of ABCDEFGHIJKL.EXT12345 is given, which is obviously invalid, the result of the parse will be a filename in the FCB of ABCDEFGH.EXT. In other words, after the first eight characters are taken, it moves over to the period and takes the next three. However, the Validate subroutine catches this type of error and sets the appropriate value in the return code.

If no extension is found after the filename is scanned, the return code is set to 8. Note that for all these return codes the value is not moved into the return code; instead, the return code is ored with the value. This sets the appropriate bit to 1 without altering the state of the other bits in the byte. Finally, when the subroutine is finished, the return-code value is placed in Retcd%, and a far return to Basic is done.

That's it for the Validate subroutine. It's yours to use and modify to fit your needs. In the next Basic/Assembly Line: a subroutine to access a disk's directory. ►

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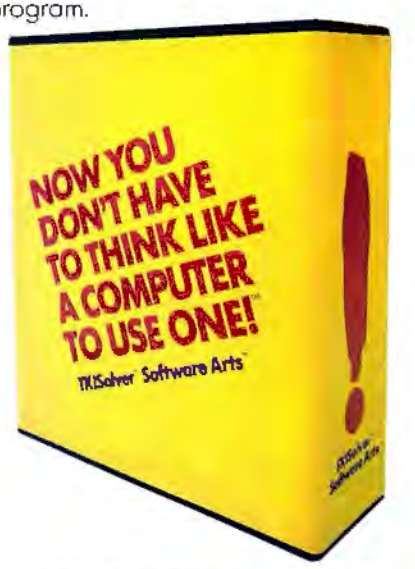

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```
                                ; VALIDATE
                                ;
                                ; THIS ROUTINE WILL CHECK FOR VALID
                                ;   FILENAMES AND IS CALLED FROM BASIC
                                ;
                                ; WRITTEN BY HOWARD GLOSSER
                                ;
                                ; RETURN CODE IS SET AS FOLLOWS...
                                ;
                                ;  1 - GLOBAL NAME
                                ;  2 - INVALID DRIVE
                                ;  4 - INVALID FILENAME
                                ;  8 - NO EXTENSION ON FILENAME
                                ;
0000                            CSEG            SEGMENT
                                                ASSUME CS:CSEG
0000 EB 03 90                                   JMP BEGIN
0003 0000                       RETCD           DW 0
0005                            VALIDATE        PROC    FAR
0005 55                         BEGIN:          PUSH BP                 ;SAVE BP FOR FAR RETURN
0006 8B EC                                      MOV BP,SP               ;MOVE STACK POINTER TO BP
0008 8B 5E 0A                                   MOV BX,[BP]+10          ;POINT BX AT PARM 1
000B 8B 77 01                                   MOV SI,1[BX]            ;GET FILENAME TO VALIDATE
000E 8B 5E 08                                   MOV BX,[BP]+8           ;POINT BX AT PARM 2
0011 8B 7F 01                                   MOV DI,1[BX]            ;GET WORKAREA
0014 2E: C7 06 0003 R 0000                      MOV CS:RETCD,0          ;MOVE 0 TO RETURN CODE
001B 56                                         PUSH SI                 ;SAVE SI REGISTER
001C B0 0F                                      MOV AL,0FH              ;BITS ON IN LOW AL REG FOR PARSE
001E B4 29                                      MOV AH,29H              ;SET UP FOR PARSING FILENAME
0020 CD 21                                      INT 21H                 ;DOS INTERRUPT
0022 5E                                         POP SI                  ;RESTORE SI REGISTER
0023 3C 01                                      CMP AL,01H              ;DO WE HAVE A GLOBAL NAME?
0025 75 07                                      JNE CKDRV               ;NO - CHECK DRIVE
0027 2E: 81 0E 0003 R 0001                      OR CS:RETCD,01H         ;YES - INDICATE GLOBAL NAME
002E                            CKDRV:
002E 80 7C 01 3A                                CMP BYTE PTR [SI]+1,':' ;IS THERE A DRIVE LETTER?
0032 75 0E                                      JNE CKNAME              ;NO - CHECK THE NAME
0034 83 C6 02                                   ADD SI,2                ;YES - SET SI PAST LETTER/COLON
0037 3C FF                                      CMP AL,0FFH             ;IS IT VALID?
0039 75 07                                      JNE CKNAME              ;YES - GO CHECK NAME
003B 2E: 81 0E 0003 R 0002                      OR CS:RETCD,02H         ;NO - INDICATE INVALID DRIVE
0042                            CKNAME:
0042 80 7D 01 20                                CMP BYTE PTR [DI]+1,' ' ;INVALID CHARACTERS IN NAME
0046 75 0A                                      JNE SCANAME             ;NO - SCAN FOR NAME
0048 2E: 81 0E 0003 R 0004                      OR CS:RETCD,04H         ;YES - INDICATE INVALID NAME
004F EB 3E 90                                   JMP NAMEDONE            ;DONE - GO LEAVE SUBROUTINE
0052                            SCANAME:
0052 B0 2E                                      MOV AL,'.'              ;SET AL FOR END OF NAME SCAN
0054 B9 0009                                    MOV CX,9                ;SCAN 9 CHARACTERS
0057                            NAMELOOP:
0057 38 04                                      CMP BYTE PTR [SI],AL    ;GET A HIT ON '.'
0059 74 12                                      JE  CKEXT               ;YES - CHECK EXTENSION
005B 80 3C 20                                   CMP BYTE PTR [SI],' '   ;HIT A BLANK
005E 74 28                                      JE  NOEXT               ;YES - NO EXTENSION ON NAME
0060 46                                         INC SI                  ;BUMP NAME ONE CHARACTER
0061 E2 F4                                      LOOP NAMELOOP           ;DO AGAIN
0063 2E: 81 0E 0003 R 0004                      OR  CS:RETCD,04H        ;GET HERE - NAME'S INVALID
006A EB 23 90                                   JMP NAMEDONE            ;DONE - GO LEAVE SUBROUTINE
006D                            CKEXT:
006D 46                                         INC SI                  ;BUMP SI PAST '.'
006E B0 20                                      MOV AL,' '              ;SET AL FOR EXTENSION SCAN
0070 B9 0004                                    MOV CX,4                ;SCAN 4 CHARACTERS
0073 38 04                                      CMP BYTE PTR [SI],AL    ;GET A HIT ON ' ' AT START
0075 74 18                                      JE NAMEDONE             ;YES - THERE'S NO ACTUAL EXT
0077                            EXTLOOP:
0077 38 04                                      CMP BYTE PTR [SI],AL    ;GET A HIT ON ' '
0079 74 14                                      JE  NAMEDONE            ;YES - FILENAME IS OKAY
007B 46                                         INC SI                  ;BUMP TO NEXT CHARACTER IN EXT
007C E2 F9                                      LOOP EXTLOOP            ;DO AGAIN
007E 2E: 81 0E 0003 R 0004                      OR  CS:RETCD,04H        ;GET HERE - NAME'S INVALID
0085 EB 08 90                                   JMP NAMEDONE            ;DONE - GO LEAVE SUBROUTINE
0088                            NOEXT:
0088 2E: 81 0E 0003 R 0008                      OR CS:RETCD,08H         ;NO EXTENSION - INDICATE THIS
008F                            NAMEDONE:
008F 8B 7E 06                                  MOV DI,[BP]+6           ;POINT DI AT PARM 3
0092 2E: A1 0003 R                             MOV AX,CS:RETCD         ;PUT RETURN CODE IN AX
0096 89 05                                      MOV [DI],AX             ;MOVE RETURN CODE FOR BASIC
0098 5D                                         POP BP                  ;RESTORE BP
0099 CA 0006                                    RET 6                   ;RETURN WITH 3 PARMS ON STACK
009C                            VALIDATE        ENDP
009C                            CSEG            ENDS
                                                END
```

Figure 3.

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SYSTEM Notebook

by Alan Boyd

Break, Verify, Set, Ctty, and Prompt

Last month we started covering DOS 2.0 internal commands, such as the simple *vol* and *ver*. This month we'll take a look at other internal commands, some of which have considerably more substance.

Break. The first command that we'll review is *break*, an internal command that made its first appearance along with DOS 2.0. The *break* command sets, resets, and reports on the status of the extended control-break function. That sounds like a mouthful. To understand the *break* command you must first understand a little bit about control-break and the effect that it has on the operating system.

Control-break is used to halt many DOS processes and is universally used by the languages operating under DOS as a halt function, allowing the user to break out of any process as fast as possible. DOS, however, is a single-tasking operating system, which means it can do only one thing at a time. Therefore some time must always elapse and some DOS functions must be completed before DOS can check to see if the control-break combination has been pressed. This is because DOS has to poll the keyboard processor to find out if any keys have been pressed while it was off performing the last function. If a key (or key combination) has been pressed, DOS needs to determine what the key (or combination of keys) is.

As a matter of fact, every time DOS services certain devices, it also deliberately checks to see if the control-break combination has been pressed. However, this does not happen as often as would be appropriate for certain functions. To grasp this concept firmly you need to understand an exceptionally powerful concept—another way to talk to DOS.

Most people are familiar only with the standard keyboard-and-file method of passing information to DOS and commanding it to perform its tricks. This communication between the operating system and the user takes place entirely through the command line processor, or shell. This is the part of the operating system that puts the familiar A> prompt on the screen and interprets commands entered at the keyboard. However, beneath this level sits a whole world that a skilled programmer can access.

The lower levels of DOS are structured as a series of *system calls*. A system call is a method of addressing the operating system that specifies one particular action. For example, there are DOS system calls for opening and closing files, for reading and writing blocks to and from the disk, for putting a character on the screen, for getting a character from the keyboard, and so forth. Even the simplest of programs makes a very large number of DOS system calls during its operation. DOS checks for a control-break during only some of these calls. If DOS checked during every system call, the operating system would perform much more slowly.

DOS checks for control-break whenever it sends a character to the video screen (which is obviously very often), whenever it is instructed to get a key from the keyboard (which is almost as often), whenever it sends a character to the printer, and whenever it sends or receives a character from any peripheral device (these system calls all belong to the category of character I/O). Although this seems like a staggering number of times to check for a key combination, there are actually situations when it may be best for DOS to check more often.

For example, any computer operation that doesn't require input or output for long periods is a candidate for extended control-break checking. Examples of such activities include the compiling or assembly processes associated with program development. During these processes the computer is given a file called the source file and is expected to transform the information in that file into a second file called the object file. Given a particularly slow compiler or assembler and a

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particularly long program, the process could go on for hours without DOS's looking for keypresses or sending a character to the screen or any other device. Obviously, a better method of stopping such a process is needed.

The answer is supplied by the *break* command. When the extended break check is turned on, DOS will check for the control-break combination every time a system call is made. This means that it checks every time the disk system is called and every time the operating system is asked to handle a memory management function. In fact, it checks any time the operating system is called to perform any function.

There is no good way to demonstrate the use of the *break* command with the simple utilities supplied by DOS. However, the pc users who are most likely to use the *break* command are programmers, who undoubtedly have access to compilers and assemblers that eat up large chunks of processing time.

To turn on the extended control-break checking simply enter

```
A>BREAK ON
```

To turn it off enter

```
A>BREAK OFF
```

If you cannot remember the current break-checking status, simply enter the single word

```
A>BREAK
```

and DOS will respond by telling you either

```
BREAK is on
```

or

```
BREAK is off
```

Like many other commands oriented toward the more technical user, *break* is a very suitable candidate for inclusion in a batch file, although it is not in itself regarded as a batch command.

Verify. Our next DOS internal command is *verify*, which, like the other commands in this category, was not present in DOS 1—or was it? You may remember from our discussion of commands such as *copy* that there is a /V switch that can be added to some commands that will force them to verify a writing process.

A computer verifies a writing process by reading it back into memory and comparing the written image with the original; if it finds any discrepancies, it retries the process. After a prespecified number of tries, the system generates an error message and proceeds to the next step. In DOS, the error message is usually the "Abort, Retry, Ignore?" that we all have come to know and love.

With the new *verify* command built in to DOS 2.0, you can tell the operating system to verify every writing process, thereby flagging all writing errors. To do this, simply turn the *verify* command on by entering

```
A>VERIFY ON
```

When *verify* is on, any disk operation that involves writing will be noticeably slower. However, the integrity of the data being written will be guaranteed to a much greater extent.

To turn it back off simply enter

```
A>VERIFY OFF
```

As with other DOS commands of this type, if you need to know the current status—either on or off—simply enter the command with no arguments—

```
A>VERIFY
```

DOS will return either

```
VERIFY is off
```

or

```
VERIFY is on
```

Once it's on, *verify* stays on until the computer is turned off or the state is reset by means of another *verify* command. You should be

aware that it is possible for an application program to turn *verify* off through a DOS call without warning the user. Therefore, if you are preparing to copy some very important files it is best to turn *verify* on immediately before you copy the files. In fact, it may be beneficial to create a batch file for the process that turns the *verify* on.

Set. The *set* command is yet another internal command that made its first appearance with DOS 2.0. Its full name is the *set environment* command, and it has been promoted in the IBM manual to the status of an advanced DOS command. *Set* allows you to customize the environment—the particular setup of the operating system—by using string variables, much the way a programming language does.

The format of the *set* command is quite simple. It looks almost like a variable assignment statement in Basic. The generic form of the command is

```
SET $1=$2
```

where $1 is the ASCII string that is to be set and $2 is the ASCII string that $1 is to be set to.

This explains *how* it is used. *Why* it is used is a more complex question. *Set* has been placed among the advanced DOS commands because it really falls into the domain of the application programmer (or the maintenance group involved in debugging or setting up systems for inexperienced users).

Once a string has been set in the environment, the "alias" to which it has been set can be used by any application program that uses the environment. This may seem a little strange at first, particularly since an application program must be set up to make use of the environment. Once an environment has been set, the information is passed through DOS to whatever program is to use it. In technical terms, the Code Segment (or Program Segment, as IBM calls it) Prefix contains a pointer to the environment table.

In addition to any variables defined by the use of the *set* command, the environment table contains information that is important to application programs running under DOS. For example, have you ever wondered how programs running under DOS manage to keep track of where the appropriate Command.com file is located? Or, to take another example, if you set a path or two for DOS to use, how is the path information passed to an application program? The answer is, of course, through the environment table.

The *set* command has a mode whereby the contents of the current environment can be checked. To see this for yourself, simply enter the command *set* with no other parameters. This should produce the following:

```
A>SET
PATH=
COMSPEC=A:\COMMAND.COM
```

This is the raw, unmodified environment to which DOS defaults when it first is booted. As you can see, no path is set. If you define a new path using the *path* command, the environment will be modified accordingly. Try it.

```
A>SET
COMSPEC=A:\COMMAND.COM
PATH=\USR1\FILES
```

The path variable was reset and moved to the end of the list. Now, when DOS or an application program running under DOS is searching for a file, it will look along the specified path if it does not find the file in the currently logged directory. It is through this environment table that DOS passes this information to an application program.

Similarly, the Comspec variable that's automatically set in the environment points to the path along which the proper command processor (Command.com) will be found. This usually will be the root directory on the drive from which the system was booted. This parameter is used by DOS to reload the command processor when it needs to.

For setting and resetting environment parameters using the *set* command, there are the usual two forms of the command. The first is used for aliasing variables. For example, to set the string USR1 to be /DEBUG1, the command

```
A>SET USR1=DEBUG1
```

can be used. If we now look at the environment table we see that the string USR1=DEBUG1 has been added.

```
A>SET
COMSPEC=A:\COMMAND.COM
PATH=\USR1\FILES
USR1=DEBUG1
```

The new addition to the environment can be used to alias the string USR1 to DEBUG1 in an application program. This would allow the programmer to, say, switch directories for debugging purposes at run time.

There are other uses for the *set* command, particularly with batch files, as we will see later when we take an in-depth look at the new, improved batch facilities of DOS 2.0.

Ctty. The last of the new internal commands to appear with DOS 2.0 is the powerful *ctty*, which is used to change the command console. This command is particularly useful in those configurations where a remote terminal is attached to the pc through a serial line or where a printer that also has a keyboard is attached.

The effect of *ctty* differs from simple I/O redirection in that all input and output, including error messages, is redirected to the auxiliary console. Under standard redirection, of course, the error messages will still be displayed on the console screen. The *ctty* command actually tells DOS to replace the keyboard and screen with whatever device is assigned to it.

Obviously, the auxiliary device must be character-oriented and have both input capabilities (such as a keyboard) and output capabilities (either a screen or a printout device). It doesn't make sense to change the command console to a disk drive or any other device that doesn't have a character-input facility.

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When a remote terminal is attached to the pc through a serial port and the port is configured through the *mode* command to work with the terminal at the correct speed, it is perfectly feasible to operate the pc from either the main console or the remote terminal. Of course you have to tell DOS manually to switch control before you leave the main console; otherwise it will ignore whatever is entered on the remote console.

The way to tell DOS to switch command consoles to the remote device is to use the *ctty* command along with the reserved device names that you have been using all along. The generic format is

CTTY device

where *device* is one of the reserved device names—Aux, Com1, or Com2. Invoking the command will cause the main console to go dead and all activity to be directed to the remote device. To return command to the main console, you need to enter the command

A>CTTY CON

on the remote terminal. This will restore the default status and redirect all communications through the main keyboard and screen.

As we shall see later, DOS also allows users to create and install new devices on their own. The new devices are interfaced to DOS through an installable device driver. If a new character-oriented I/O device is installed, DOS can direct main I/O to it through the *ctty* command. This, however, is well beyond the capabilities of most users, since it involves the creation of complex device drivers in assembly language. If a manufacturer ships such a device driver with its hardware, it is possible to direct I/O to the device through the installed device driver. For information on how to do that you should first consult the manufacturer and confirm that his device driver conforms to all the DOS requirements first.

Prompt. The *prompt* command is unusual because the DOS manual says that it's an external DOS command. An examination of the two disks supplied with the DOS package, however, reveals no file called Prompt.com. Manual notwithstanding, *prompt* in fact is internal and does not require DOS to access anything from the disk system.

The purpose of the *prompt* command is to change the command prompt that DOS throws on screen when it is free and waiting for you to enter your next command. In its default condition, the standard DOS prompt is the one we all immediately recognize.

A>

The first character is always the default drive letter and is always followed by the > character. Very convenient and informative.

Why would anyone want to change it? Because computer people tend to be very particular about their prompts, and everyone has a different prompting system that they like and feel comfortable with.

Unfortunately, just about every major operating system in use has a different prompting system, and many people use them so much that they begin to feel comfortable with a particular scheme. This is particularly true of users of mainframe and minicomputer systems such as Unix, TOPS-10 and TOPS-20, OS, and RSTS. People become locked into a particular prompting scheme and complain that their pc is inferior because it can't emulate their favorite flavor of prompting. Now, through the *prompt* command, DOS supplies a do-it-yourself prompt-generating kit.

The simplest way to use the *prompt* command is to enter

PROMPT text

where *text* represents the string that you would like the new prompt to be. For example, if you are the dominant type and prefer to have a master/slave relationship with your pc, you could change the prompt with something like

A>PROMPT Yes, Boss?

Which would cause DOS to prompt you in all future cases with

Yes, Boss?

If you are changing your prompt to something like this, you should be careful to leave a blank space at the end of the command before pressing the enter key, so there will be a space at the end of the prompt. Otherwise, when you enter commands it will be difficult to differentiate the command from the prompt.

The only limits to the type of prompt that you can design using this method are the 127-character maximum command line length and your imagination. Of course, since *prompt* takes up six of the 127 characters available on the command line and the space takes up another, the longest prompt that you can have is 120 characters. But that ought to be enough to tickle even the most bizarre or devious sense of humor.

For those who prefer their prompts to be something other than simply humorous and who actually like to have them do something, DOS provides a menu of options that can be applied to the prompt. These include everything from the current time of day to the version number of DOS. You specify these special features by means of a cute little prompt construction metastring language.

For example, this system is capable of displaying the currently logged disk drive in much the same way as the default prompt. If you wanted a new prompt that read

You are currently logged on to drive X

where *X* is the current drive, you could enter the command

PROMPT You are currently logged on to drive $n

The dollar sign is used in this prompt kit to specify a particular system function. The *n* that follows the dollar sign means that you want the currently logged disk drive letter to be displayed in that position.

Thirteen functions are available for your use in building prompts. All are specified by single characters following a dollar sign. The functions are:

t	the current system time
d	the current system date
p	the currently logged directory pathname

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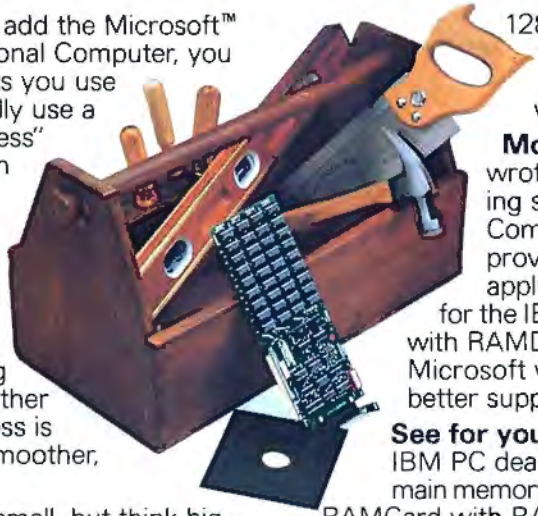

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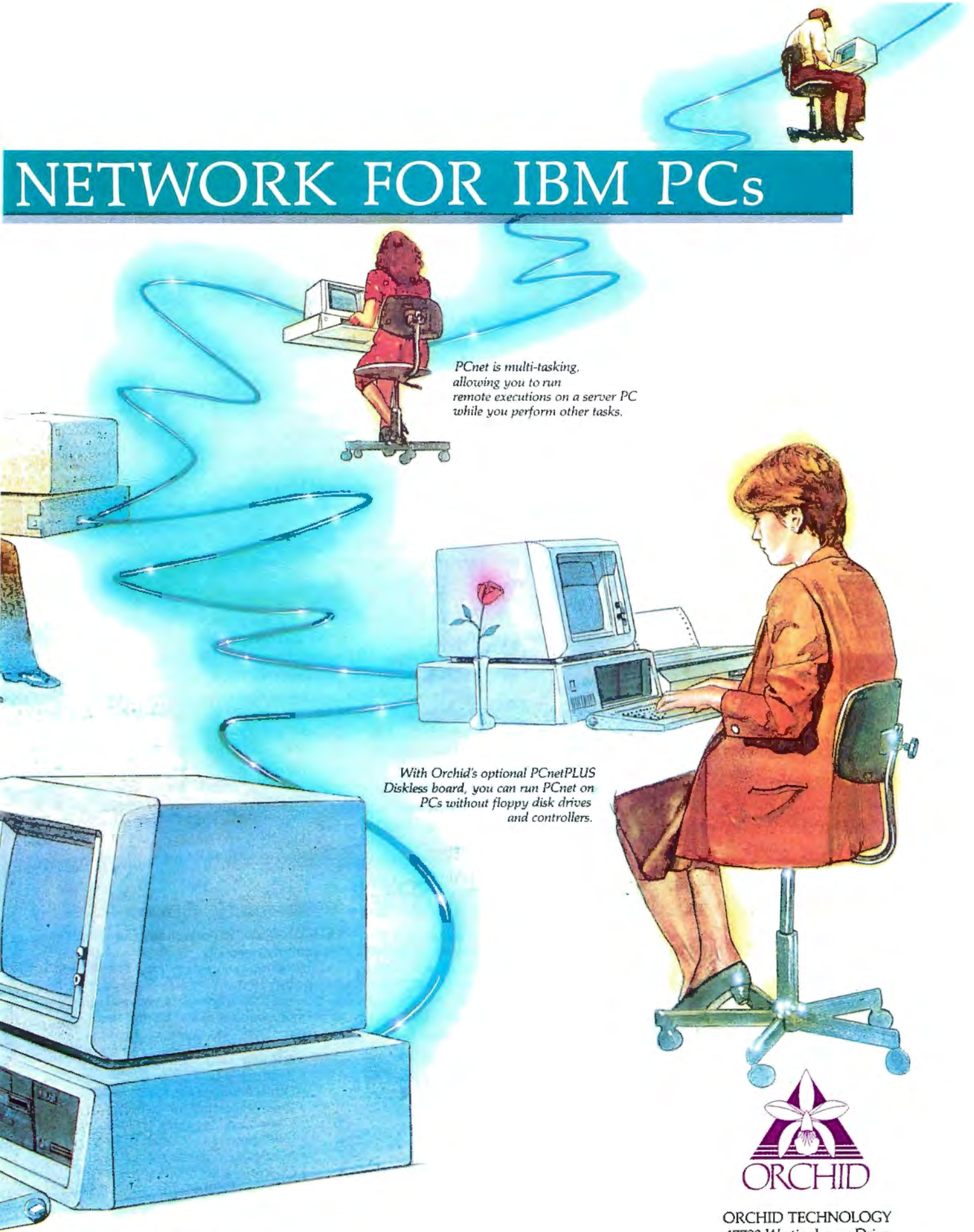

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n	the currently logged drive letter
v	the version number message of the active DOS
g	the standard) symbol
l	the opposite (symbol
b	the bar (|) symbol
q	the = symbol
$	the $ character
h	when used causes a backspace character
e	the escape character
_	the carriage return—line feed sequence that causes a new line

The last one on this list—the carriage return specifier—is an underscore character, not to be confused with the hyphen.

Let's look at another example. To create a prompt containing both the system time and the standard system prompt, you would issue the command

```
PROMPT The time is $t $n$g
```

which would result in

```
The time is 9:59:38:28 A)
```

As you can see, the various functions available are positioned in the prompt wherever the dollar sign is located.

The first five functions are self-explanatory. The $t inserts the current system time at the specified position. The time is entered in the usual format of *hh:mm:ss.xx*, where *xx* represents hundredths of a second. The $d inserts the current system date in its standard format—*Tue 8-09-83*.

The third function on the list is $p, which inserts the currently logged directory pathname into the prompt and provides you a convenient method of knowing which directory you are currently logged onto.

The $n function inserts the currently logged drive letter into the prompt in exactly the same manner as the standard prompt. The $v function inserts the standard DOS version-number message into the prompt. In DOS 2.0, the standard's version number message is

```
IBM Personal Computer DOS VERSION 2.00
```

The next four options are simply methods whereby you can place certain characters into the prompt without confusing DOS. For example, the (and) characters are generally parsed by the DOS command line processor as being I/O redirection symbols to tell DOS to redirect the standard input and output to and from various files or devices. If they were to be entered on the command line in the *prompt* command, DOS would draw a false conclusion. You include them in the prompt, therefore, by placing the appropriate symbol after the dollar sign.

So, if you wanted to go to the trouble to create the standard DOS prompt by means of the *prompt* command, you could enter

```
A)PROMPT $n$g
```

which tells DOS to construct a prompt that contains the currently logged disk drive letter immediately followed by the) sign, which is the standard DOS prompt.

Similarly, the pipe symbol can still be included in the prompt by using a *$b* (for *bar*), which tells DOS to insert a | character at that position.

The equal sign character is a special case. If you want to put an equal sign into a prompt amid other text, simply enter it as normal text. That is to say, if you enter

```
PROMPT 1+1=2
```

you will be rewarded with the appropriate prompt

```
1+1=2
```

But if you want to create a prompt that is simply the equal sign by itself, which is what some operating systems use, you have to enter the $= combination after the *prompt* command.

Last but not least is the dollar sign itself. What if you want to create a prompt that includes the dollar sign, either alone or with other text? Obviously, Microsoft would never leave all the devoted (not to say fanatical) Unix hackers out in the cold. Now you can even make DOS look like the Unix shell. The way to do this is simply to enter two dollar signs in a row at the appropriate position. For example, to create the single, Unix-like dollar sign prompt, enter

```
A)PROMPT $$
$
```

The other three characters in the prompt-construction kit that perform specific functions are all powerful features that further enhance the capabilities of the *prompt* command. The first of these, the $h combination, causes a backspace character to be generated. This is fairly easy to remember if you know that the standard ASCII backspace character is control-H. Try typing control-H in the middle of a command line and see it at work for yourself.

The backspace character is a tool that you can use to construct prompts in several ways, some of them useful, others more in the comic vein. The more successful methods include the shortening of other standard functions. For example, the date function *$d* will always emit something that looks like

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```
Tue  8-09-1983
```

If you tack five backspace characters onto it, the prompt ends up being

```
Tue  8-09
```

Ten backspace characters would produce a prompt that specified only the first three characters of the day of the week—pretty handy. Here's what that would look like:

```
PROMPT $d$h$h$h$h$h$h$h$h$h
```

By combining these functions, you can create complex prompts. For example

```
A>PROMPT $d$h$h$h$h$h$h$h$h$h$th$h$h $n$g
```

produces a prompt containing the day of the week, the current time (less the hundredths of a second), and the standard DOS prompt:

```
Tue 2:01:42 A>
```

As you'll see if you try this, there is a little flashing going on in the prompt as the backspace characters erase previously printed characters. This is also an effect that can be put to use in a whimsical manner. For example, try the prompt

```
A>PROMPT This is a test$h$h$h$h$h$h$h$h$h$h$hat's all folks
```

or, if you can handle it, try the more complex and artistic prompt

```
PROMPT $n$g$h $g$h $g$h $g$h $g$h $g$h
$g$h$h$g$h$h$g$h$h$g$h$h$g$h$h$g
```

which creates the standard DOS prompt but adds a little animation along the way. It should be more than enough to delight your friends and astonish your local IBM expert.

The function of the $e combination is to place an escape character into the prompt. The reason for doing this may not be apparent at this time. However, we will return to this capability later and discover how it can be used to position the cursor at a specific location, such as the top of the screen, and how it can be used to perform such tasks as clearing the screen and setting colors.

The last of the prompt creation tools that we need to look at is $_. This one causes the prompt system to place a carriage return in the middle of the prompt. The best way to illustrate its use is simply to create the most extravagant, superduper, granddaddy prompt of them all, using all the bells and whistles available to us.

To create this prompt, enter the following:

```
A>PROMPT Hello, this is the $v$_The time is $t$_The date is
$d$_You are logged on to drive $n$_Your directory is $p$_$$
```

Which will result in the most unlikely of prompts:

```
Hello, this is the new IBM Personal Computer DOS Version 2.00
The time is 2:26:19:17
The date is Tue 8-09-1983
You are logged on to drive A
Your directory is A:\USR1\FILES
$
```

If this gets to be too much for you, you can return to the simple standard DOS prompt by entering the *prompt* command with no argument.

As a final word to tie two of these new concepts together, it is worth mentioning that the prompt information is made part of the environment table we saw earlier. If you change the prompt and then take a look at the environment table by issuing the null *set* command (*set* with no arguments), you'll see that the prompt information is included.

```
PROMPT $t$h$h$h$_$n$g
4:31:15
A>SET
COMSPEC=A:\COMMAND.COM
PATH=/USR1\FILES
PROMPT=$t$h$h$h$_$n$g
```

As you can see, the *prompt* command is one of the more entertaining DOS commands. There are few rules, except that your prompt should be recognizable as a prompt. Have fun and, until next month, happy prompting. ▲

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XTsr ARRIVES BEFORE PC*jr*

IBM STUFFS 370 POWER INTO THE XT

by John Dickinson

IBM's answer to Lisa, the Star, VisiOn, *and* DesQ? *The 3270-PC allows users to create as many as seven windows on a new high-resolution, eight-color, fourteen-inch, tilt-and-swivel monitor. The system also, of course, functions as a terminal, permitting users to access data from multiple host computer applications.*

On October 18, amidst the frenzy of rumors about a new and smaller home machine, IBM announced its new PC-XT/370 computer, a System/370-compatible version of the XT. Current XT owners who thought they were driving the year's hot machine from IBM found out that they only have the street-legal version; the new machine makes it clear that IBM is gearing up for the Indy 500 and intends to win the race.

The XT/370 is a standard XT enhanced by three expansion cards, the most interesting of which contains the processing horsepower to turn the XT into a 370. Two customized Motorola 68000 thirty-two-bit microprocessors on this card, along with an Intel 8087 floating-point processor, give the machine its oomph. One of the Motorolas provides 72 of the S/370's 132 hardware instructions. An additional 45 S/370 instructions are provided by the second 68000, and the 8087—also modified for IBM—contributes the floating-point power required for full S/370 compatibility. The remaining S/370 instructions are not required for the XT/370.

The other two cards contain RAM memory (512K) and the 3277 Model 2 terminal-emulation package required for operation as a standard 3270 series bisynchronous terminal.

The three-card package can be added to existing XTs as a field upgrade (IBM swears they did not change a "single wire" on the XT chassis to make the new machine).

The XT/370's software environment is controlled by a supervisory program called VM/PC. At the toggle of a key (sometimes two toggles), the user can switch between standard DOS 2.0 and the S/370 VM/CMS operating system. While logged on to DOS, the user faces a standard 640K XT with one or two ten-megabyte Winchester disks and the usual complement of floppy disk drives. When logged on to VM/CMS, that same user looks at a monstrous four-megabyte (4M) virtual-memory machine with 512K of real memory available, using the same disk configuration. The paging required for virtual memory is done on the Winchester disk.

The DOS 2.0 environment operates just as you'd expect it to. Any application currently available should run without problems, and IBM implied that any current expansion cards you may have could be left in place, although it's clear that you have to use the new IBM memory card for the S/370 environment to work correctly (it requires special memory busing in order for it to switch address spaces).

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The VM/CMS environment operates as a single-user version of the normally time-shared mainframe system. It is limited to 4M of virtual memory (which is the practical limit in most time-sharing shops, even though the system architecture allows for 16M) and cannot run slave operating systems (standard VM/CMS can run other mainframe systems such as DOS/VSE and MVS). However, IBM claimed that it hasn't found a VM/CMS application that won't run on the XT/370. The machine yields the power of a low-end 4300 mainframe when in VM/CMS mode.

Files can be shared between DOS and VM/CMS on the Winchester disk or the floppies. Data can also be transferred between the XT/370 and the host processor, and VM/CMS applications can be up- and down-loaded between the host and the XT/370. The XT/370 can also operate as a standard 3270 terminal.

Targeted users of the new machine are data processing professionals, the engineering and scientific communities, and business professionals using VM/CMS in-house. As the XT/370's primary benefits IBM cited flexibility and increased computing power for the end user. The biggest benefit of all for IBM mainframe users is that the XT/370 will help protect their substantial investment (in the billions of dollars) in System/370 software.

Data processing managers have been after IBM to provide a compatible micro to stem the onslaught of pc users who are demanding customized link-ups to their mainframes and to protect access to corporate databases. The XT/370 fulfills this need and more.

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NEW TERMINAL DOES WINDOWS

At the same news conference, IBM announced the 3270-PC, another major pc-based machine. The 3270-pc is a hydra-headed 3270 terminal that can be logged on to as many as seven concurrent applications. The user can be attached to up to four host processor tasks, one normal DOS task, and two *PC Notepad* (a new scratchpad-type application) jobs at the same time. The display screens from each application can be viewed separately or can be windowed on top of one other, a la Xerox Star or Apple Lisa. Any data item can be transferred from one application to another via the screen windows. The cursor control keys and other keys control window and data movement.

The 3270-PC is a standard pc enhanced by a new color monitor and keyboard. The IBM representative mentioned "new logic," but it was unclear whether this meant a new processor or different BIOS chips. The monitor is an eight-color model offering monochrome-quality resolution and medium-resolution graphics. It has a fourteen-inch screen and is mounted on a tilt/swivel base. The new monitor is not available for standard pcs, but the new machine can use the standard pc monochrome monitor.

The keyboard looks like a standard pc keyboard with a bad overbite. IBM has merged the standard model with all the keys available on their 3270 terminals for a total of 122 (!) keys. Those who think the pc doesn't have enough keys will be pleased with the new keyboard.

The 3270-PC also answers the needs of mainframe data processing managers who are plagued with user requests to merge data from different applications. Shops typically have applications where data transfer or merging is critical for business reasons but impossible for technical reasons. The 3270-PC fills this need quite well, although it will be a while before applications can actually take data from a merged screen and bring it back to the mainframe or pc database. But the capability exists at the pc end of things, including the capability of merging data from DOS applications with a CICS or IMS system.

Two other important pc announcements were the introductions of the 3279 (color) version of the bisynchronous communications expansion card and the companion pc enhancement for the 3279 terminal. These are both functionally equivalent to the 3278 (monochrome) expansion cards announced earlier this year. Other announcements included a new high-end 8100 computer (the 8150) and enhancements to IBM's SNA communications architecture that facilitate editable and final document interchange among IBM's various office automation systems, such as the Datamaster.

The new pc-based machines are attractively priced. The XT/370 is priced at $10,000 with one Winchester disk, or $13,000 with two, and the expansion cards can be purchased separately for $3,000. The 3270-PC ranges in price from $4,000 to $7,000, depending on disk configuration, and the new color monitor goes for $950. Software is priced separately; the VM/CMS price varies, depending on the customer's existing mainframe contract. Both machines will be available next year.

Whatever else you do, don't go charging off to ComputerLand or your local IBM Product Center to order your XT/370 expansion cards, XT/370, or 3270-PC. They won't be available there now or in the foreseeable future. These are products of IBM's National Accounts Division and are clearly for the mainframe community's use. The reason is clear: The XT/370 and 3270-PC are so powerful when linked to mainframes that improper use could spell danger for the integrity of any corporation's data resource. Computer crime has been on the upsurge lately and, in the wrong hands, these babies are atom bombs! ▲

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SAVE YOUR MONITOR SCREEN!

SOCHA'S TOOLBOX
BY JOHN SOCHA

At this very moment your video monitor or IBM Monochrome Display may be in danger! The bright clear image you see on your screen, if left alone long enough, will burn itself into the surface of the screen. How's that, you say?

A Cry for Help. The image you see on your monitor is created by a stream of electrons that bombard the screen. The inside surface of the screen is coated with a material known as phosphor, and wherever the electrons strike this surface the phosphor glows green, white, or some other color (the color depends on the type of phosphor used). But the same electrons do more than create an image. They also slowly erode the phosphor layer. Eventually this process leads to holes in the screen—places where the phosphor has been etched away by the electrons, leaving black regions behind.

What can be done to prevent such damage?

The simplest preventive is to turn down the intensity before you walk away from your computer. If you don't see an image on the screen, it'll be safe from burn damage. But although simple, this method is unreliable. It's too easy to leave the display on for "just a few minutes," only to return several hours later to find the screen still brightly lit.

So in this article we'll build a machine-language program, called Scrnsave.com, that will provide a better form of burnout protection. We'll use a Basic program to create the .com file, so you won't need to know anything about machine language.

Scrnsave does its work quietly; if you leave your screen alone for three minutes, the program turns the display off until the next time you hit a key. Any keystroke at all—including the control, alt, and secretarial shift keys—will reactivate the screen, so you can bring the display back to life without affecting a running program.

First let's see how Scrnsave manages to turn the brightness off. After all, we know pcs don't have robot arms, so there must be some other way to turn off the display. And there is.

Locating the Victim. Inside your IBM pc is an input/output port that controls various functions on the display adapter. This port resides at 3D8 hex for the color/graphics adapter and 3B8 for the monochrome adapter. Figure 1 gives a list of the bits in this byte and explains briefly how they control the screen. For present purposes, we're interested only in bit 2, which turns the display on and off.

The following Basic program turns this bit off and then turns it on again after a short delay; the display will blank for a few seconds after you type *run*.

```
10 DEF SEG = &H40
20 PORT = 256*PEEK(&H64) +
   PEEK(&H63) + 4
30 OUT PORT, (PEEK(&H65) AND &HF7)
40 FOR I = 1 TO 1000 : NEXT I
```

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```
50 OUT PORT, PEEK(&H65)
60 END
```

All we need is a machine-language program to turn off this bit when three minutes have elapsed with no activity from the keyboard or on the display, right? Well, this is true if you have a color/graphics adapter. But IBM made a slight goof when it designed the monochrome adapter; bit 2 doesn't affect the cursor.

Here is a second Basic program, identical to the first one except that it turns the cursor on during the run. If you turn off the video display by setting bit 2 to 0, the display should blank and the cursor should disappear with everything else. On the monochrome display it doesn't! Run this program on a monochrome display and you'll see a blinking cursor left behind.

```
10 LOCATE ,,1        'Turn the cursor back on
20 DEF SEG = &H40
30 PORT = 256 * PEEK(&H64) + PEEK(&H63) + 4
40 OUT PORT, (PEEK(&H65) AND &HF7)
50 FOR I=1 TO 1000 : NEXT I
60 OUT PORT, PEEK(&H65)
70 END
```

No problem. Scrnsave turns the cursor off and on along with the rest of the display.

Saving the Victim. The program shown in listing 1 on page 83 builds Scrnsave.com and saves it to your default drive. Type the program in and run it once to generate Scrnsave. If you've made an error entering any of the data statements, you'll get a message indicating which line contains an error.

You need only run this program once to build Scrnsave.com, but you may wish to save it (as Scrnsave.bas, for example) just in case Scrnsave.com doesn't work correctly; you might have an error somewhere other than the data statements. If the .com file doesn't seem to work correctly, carefully check lines 10 through 280 of the Basic program.

Scrnsave.com is a machine-language program that attaches itself to DOS each time you run it; because you consume a little bit of memory with each such attachment, you should run it once only—perhaps at the time you start DOS. To attach Scrnsave.com to DOS and save your screen, just type *scrnsave* after the DOS prompt. But don't do it just yet.

You'll probably want to place the line "scrnsave" in your Autoexec.bat file so that the program runs once each time you boot DOS. If you're also using *ProKey*, it's best to run Scrnsave ahead of *ProKey* so the latter won't be able to overwrite Scrnsave.

Checking the Pulse. Now run Scrnsave once to attach it to DOS.

```
10 DIM CHECK(39)
20 FOR I=1 TO 39 : CHECK(I)=0 : NEXT I
30 PRINT "Checking";
40 FOR I=1 TO 39
50    FOR J=1 TO 8
60       READ BYTE
70       CHECK(I) = CHECK(I) XOR BYTE
80    NEXT J
90    PRINT ".";
100 NEXT I
110 PRINT
120 LINECHECK=0
130 FOR I=1 TO 39
140    READ CHECK
150    LINECHECK = LINECHECK XOR CHECK
160    IF CHECK(I) <> CHECK THEN PRINT "Data in Line";1000+10*(I-1);"may be bad."
170 NEXT I
180 IF LINECHECK <> 16 THEN PRINT "Data bad in lines 2010-2050."
190 OPEN "scrnsave.com" AS #1 LEN=1
200 PRINT "Writing. . ."
210 FIELD #1,1 AS BYTE$
220 RESTORE
230 FOR I=1 TO 310
240    READ BYTE : LSET BYTE$ = CHR$(BYTE) : PUT #1
250 NEXT I
260 CLOSE
270 PRINT "SCRNSAVE.COM created"
280 END
1000 DATA   233,   212,   0,   0,   0,   0,   0,   0
1010 DATA   0,   0,   0,   0,   0,   0,   0,   204
1020 DATA   12,   0,   0,   0,   0,   80,   30,   140
1030 DATA   200,   142,   216,   255,   14,   17,   1,   116
1040 DATA   15,   127,   6,   199,   6,   17,   1,   0
1050 DATA   0,   31,   88,   46,   255,   46,   3,   1
1060 DATA   83,   81,   82,   180,   3,   156,   255,   30
1070 DATA   11,   1,   137,   14,   19,   1,   181,   15
1080 DATA   177,   0,   180,   1,   156,   255,   30,   11
1090 DATA   1,   90,   89,   91,   82,   184,   64,   0
1100 DATA   142,   216,   139,   22,   99,   0,   131,   194
1110 DATA   4,   160,   101,   0,   36,   247,   238,   90
1120 DATA   235,   199,   80,   82,   30,   140,   200,   142
1130 DATA   216,   131,   62,   17,   1,   0,   127,   33
1140 DATA   30,   184,   64,   0,   142,   216,   139,   22
1150 DATA   99,   0,   131,   194,   4,   160,   101,   0
1160 DATA   12,   8,   238,   31,   81,   139,   14,   19
1170 DATA   1,   180,   1,   156,   255,   30,   11,   1
1180 DATA   89,   161,   15,   1,   163,   17,   1,   31
1190 DATA   90,   88,   195,   232,   196,   255,   46,   255
1200 DATA   46,   7,   1,   80,   81,   30,   184,   64
1210 DATA   0,   142,   216,   161,   16,   0,   36,   48
1220 DATA   185,   7,   6,   60,   48,   117,   3,   185
1230 DATA   12,   11,   180,   1,   156,   46,   255,   30
1240 DATA   11,   1,   31,   89,   88,   195,   232,   153
1250 DATA   255,   156,   46,   255,   30,   11,   1,   10
1260 DATA   228,   117,   3,   232,   205,   255,   207,   184
1270 DATA   0,   0,   142,   216,   250,   161,   32,   0
1280 DATA   46,   163,   3,   1,   161,   34,   0,   46
1290 DATA   163,   5,   1,   199,   6,   32,   0,   21
1300 DATA   1,   140,   14,   34,   0,   161,   36,   0
1310 DATA   46,   163,   7,   1,   161,   38,   0,   46
1320 DATA   163,   9,   1,   199,   6,   36,   0,   155
1330 DATA   1,   140,   14,   38,   0,   161,   64,   0
1340 DATA   46,   163,   11,   1,   161,   66,   0,   46
1350 DATA   163,   13,   1,   199,   6,   64,   0,   198
1360 DATA   1,   140,   14,   66,   0,   46,   161,   15
1370 DATA   1,   46,   163,   17,   1,   251,   232,   114
1380 DATA   255,   186,   215,   1,   205,   39,   0,   0
2000 '
2010 DATA   61,   204,   206,   11,   167,   186,   154,   37
2020 DATA   114,   243,   233,   166,   250,   43,   45,   227
2030 DATA   50,   195,   90,   195,   207,   243,   123,   225
2040 DATA   166,   172,   63,   45,   34,   83,   36,   34
2050 DATA   213,   68,   74,   232,   65,   253,   121
```

Listing 1.

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You won't see any change, so just sit back and wait for three minutes. After exactly three minutes the screen will blank. Just push one of the shift keys to restore the display.

Now let's try a slightly different example. Enter and run the following Basic program. You'll see the display blank after three minutes (Scrnsave does this), and about a second later it will turn on again. Why does it turn back on? The *print* statement in line 20 sends characters to the display about three minutes and one second after you type *run* (this is the case on an XT; on a Compaq you may find your screen dark a little longer than one second). Any time a program sends characters to the screen, Scrnsave turns the display back on again and resets its three-minute timer—leaving you just enough time to boil an egg.

```
10 FOR I = 1 TO 140000! : NEXT I
20 SOUND 1000,5 : PRINT "The display should be on"
30 END
```

How Do It Do It? How does Scrnsave do all this? The clock inside your pc ticks 18.2 times per second. Scrnsave contains a three-minute counter that starts at 3276—the number of clock ticks for three minutes. On each tick of the clock, Scrnsave subtracts one from this count, and it turns off the screen when it reaches zero. We need some way to reset this counter while we are using the pc, so Scrnsave also intercepts two interrupts in addition to the interrupts generated by the clock.

Each time you push or release a key, the keyboard sends an interrupt signal to the pc. Scrnsave intercepts this interrupt; each time you push or release a key, Scrnsave resets its counter to 3276 (three minutes) before passing control to the ROM BIOS routines that read keystrokes. Scrnsave also resets its counter to 3276 every time a program sends characters to the screen. By intercepting these last two interrupts, Scrnsave can tell when you need to have the screen active, so it won't shut out the lights unless you sit back or walk away for three minutes or more.

Calling Dr. Post, Dr. Mortimer Post. Now for the gory details. If you have no interest in assembly language programs, then enjoy the rest of this issue.

The assembly language program is shown in listing 2. Scrnsave intercepts interrupts using the daisy chain method that was used in Scrollk.com (for more details, see "The Scroll Lock Mystery Solved," *Softalk*, May 1983). Other details of Scrnsave are fairly straightforward. The 3x8 register for the 6845 chip is a write-only register, so if we want to change only bit 2 of this register, we need to know the state of the other bits. Fortunately, the ROM BIOS routines store the current state of the 3x8 register in memory location 465H. If you have both display adapters, this address contains the mode for the active display adapter.

There's a bug in the ROM BIOS. The INT 10 call to read the cursor position returns the cursor in the CX register—or so the technical reference states. It turns out this is true only when some program has already set the cursor type. Intitially the BIOS returns a constant: 067H for older pcs and 607H for newer ones.

The procedure Set cursor mode sets the cursor type to 0607H for the color/graphics adapter and 0B0CH for the monochrome; in other words, it establishes an underline cursor. *Scrnsave* sets the cursor type when you first run *Scrnsave* and again when any program changes the display mode. ▲

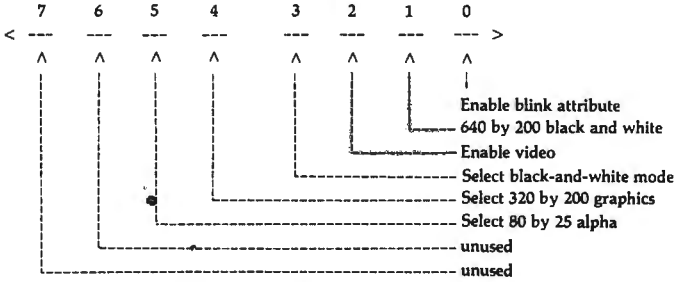

Figure 1. Mode register for display adapter. Bit 2 turns the video on and off.

```
;-----------------------------------------------------------------------;
; These are the interrupt vectors for the clock, keyboard and video_io  ;
; calls.                                                                ;
;-----------------------------------------------------------------------;
VECTORS         SEGMENT AT 0H
        ORG     8H*4
TIME_OF_DAY_VECTOR      LABEL   DWORD   ;Clock interrupt, 18.2 per sec.
        ORG     9H*4
KEYBOARD_INT_VECTOR     LABEL   DWORD
        ORG     10H*4
VIDEO_IO_VECTOR         LABEL   DWORD
VECTORS         ENDS

;-----------------------------------------------------------------------;
; This is the data area starting at 400H used by the ROM BIOS           ;
; routines. ADDR_6845 contains the base address, 3x4, of the current    ;
; display adapter and CRT_MODE_SET contains the current setting of      ;
; the display mode — the 3x8 register. Here x is B for the monochrome   ;
; display adapter, and D for the color-graphics adapter.                ;
;-----------------------------------------------------------------------;

ROM_BIOS_DATA   SEGMENT AT 40H
        ORG     10H
EQUIP_FLAG      DW      ?               ;Used to determine display type
        ORG     60H
CURSOR_MODE     DW      ?               ;Current cursor mode (start, stop line)
        ORG     63H
ADDR_6845       DW      ?               ;Base address for active display card
CRT_MODE_SET    DB      ?               ;Current setting of 3x8 register
ROM_BIOS_DATA   ENDS

;-----------------------------------------------------------------------;
; This is the start of the local data and executable code.              ;
;-----------------------------------------------------------------------;
CODE_SEG        SEGMENT
        ASSUME  CS:CODE_SEG
        ORG     100H
BEGIN:  JMP     INIT_VECTORS            ;Initialize vectors and attach to DOS


ROM_TIME_OF_DAY_INT     DD              ;Addresses for ROM routines
ROM_KEYBOARD_INT        DD
ROM_VIDEO_IO_INT        DD
```


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```
TIMER_DELAY             DW    0CCCH ;Delay before turning off video
THREE_MIN_COUNTER       DW    ?     ;Clock ticks in 3 minutes

OLD_CURSOR_TYPE         DW    0     ;Hold the old cursor type

;-------------------------------------------------------------------------;
;  Turn the video display off after three minutes of no use.              ;
;                                                                         ;
;  Calls:      ROM_TIME_OF_DAY_INT                                        ;
;  Reads:      ADDR_6845, CRT_MODE_SET                                    ;
;  Writes:     THREE_MIN_COUNTER, OLD_CURSOR_TYPE                         ;
;-------------------------------------------------------------------------;

INTERCEPT_TIME_OF_DAY   PROC  NEAR
        PUSH    AX
        PUSH    DS
        MOV     AX,CS                   ;Set data segment to current segment
        MOV     DS,AX
        ASSUME  DS:CODE_SEG ,
        DEC     THREE_MIN_COUNTER       ;Have 3 minutes elapsed?
        JZ      TURN_VIDEO_OFF          ;Yes, turn video off
        JG      GOTO_ROM_TIME_OF_
                DAY                     ;No, keep video on
        MOV     THREE_MIN_COUNTER,0     ;Video is off, reset counter to 0 again
GOTO_ROM_TIME_OF_DAY:
        POP     DS
        POP     AX
        ASSUME  DS:NOTHING
        JMP     ROM_TIME_OF_DAY_ INT
TURN_VIDEO_OFF:
        ASSUME  DS:CODE_SEG
        PUSH    BX
        PUSH    CX
        PUSH    DX
        MOV     AH,3                    ;Get current cursor type into CX
        PUSHF                           ;Push flags to simulate INT with CALL
        CALL    ROM_VIDEO_IO_INT        ;Must use call since INT 10 points here
        MOV     OLD_CURSOR_TYPE,CX      ;And save it.
        MOV     CH,0FH                  ;Now remove cursor from screen
        MOV     CL,0
        MOV     AH,1
        PUSHF                           ;Push flags to simulate INT with CALL
        CALL    ROM_VIDEO_IO_INT        ;Must use call since INT 10 points here
        POP     DX
        POP     CX
        POP     BX

        PUSH    DX                      ;Turn the display video off
        MOV     AX,ROM_BIOS_DATA
        MOV     DS,AX
        ASSUME  DS:ROM_BIOS_DATA
        MOV     DX,ADDR_6845            ;Get base address for display adapter
        ADD     DX,4                    ;IO address for 3x8 register
        MOV     AL,CRT_MODE_SET
        AND     AL,0F7H                 ;Turn video off
        OUT     DX,AL
        POP     DX
        JMP     GOTO_ROM_TIME_OF_ DAY

INTERCEPT_TIME_OF_DAY   ENDP
;-------------------------------------------------------------------------;
;  This procedure resets the timer count to 0CCCH and turns the display   ;
;  on if it was off.                                                      ;
;-------------------------------------------------------------------------;
RESET_COUNTER   PROC  NEAR
        PUSH    AX
        PUSH    DX
        PUSH    DS
        MOV     AX,CS
        MOV     DS,AX
        ASSUME  DS:CODE_SEG
        CMP     THREE_MIN_COUNTER,0     ;Was the display off?
        JG      VIDEO_NOT_OFF           ;No, then just reset counter
        PUSH    DS                      ;Yes, then turn video back on
        MOV     AX,ROM_BIOS_DATA
        MOV     DS,AX
        ASSUME  DS:ROM_BIOS_DATA
        MOV     DX,ADDR_6845            ;Get base address for display adapter
        ADD     DX,4                    ;IO address for 3x8 register
        MOV     AL,CRT_MODE_SET
        OR      AL,8                    ;Turn video on again
        OUT     DX,AL
        POP     DS
        ASSUME  DS:CODE_SEG
        PUSH    CX                      ;Now restore the cursor
        MOV     CX,OLD_CURSOR_TYPE
        MOV     AH,1                    ;Restore the old cursor type
        PUSHF                           ;Push flags to simulate INT with CALL
        CALL    ROM_VIDEO_IO_INT        ;Must use call since INT 10 points here
        POP     CX
VIDEO_NOT_OFF:
        MOV     AX,TIMER_DELAY
        MOV     THREE_MIN_ COUNTER,AX

        POP     DS
        POP     DX
        POP     AX
        RET
RESET_COUNTER   ENDP

INTERCEPT_KEYBOARD_INT  PROC  NEAR
        ASSUME  DS:NOTHING
        CALL    RESET_COUNTER           ;Reset the time-out counter
        JMP     ROM_KEYBOARD_INT        ;Pass control to ROM routine
INTERCEPT_KEYBOARD_INT  ENDP

;-------------------------------------------------------------------------;
;  This procedure resets the cursor type to the default type for the      ;
;  display adapter in use: 607H for the color/graphics adapter and        ;
;  0C0BH for the monochrome display adapter.                              ;
;-------------------------------------------------------------------------;

SET_CURSOR_MODE PROC  NEAR
        PUSH    AX
        PUSH    CX
        PUSH    DS
        MOV     AX,ROM_BIOS_DATA
        MOV     DS,AX                   ;Point to ROM BIOS data area
        ASSUME  DS:ROM_BIOS_DATA
        MOV     AX,EQUIP_FLAG           ;Determine which adapter is active
        AND     AL,30H                  ;Isolate adapter information
        MOV     CX,607H                 ;Set for color/graphics adapter
        CMP     AL,30H                  ;Is monochrome display active?
        JNE     COLOR_ ACTIVE           ;No, set cursor type
        MOV     CX,0B0CH                ;Cursor mode for monochrome display
COLOR_ACTIVE:
        MOV     AH,1                    ;Call for set-cursor-type
        PUSHF                           ;Simulate INT 10 with PUSHF and CALL
        CALL    ROM_VIDEO_IO_INT
        POP     DS
        POP     CX
        POP     AX
        RET
SET_CURSOR_MODE ENDP

;-------------------------------------------------------------------------;
;  This procedure resets the time-out counter, and passes control on      ;
;  to the ROM VIDEO_IO routines.                                          ;
;-------------------------------------------------------------------------;
INTERCEPT_VIDEO_IO      PROC  NEAR
        ASSUME  DS:NOTHING
        CALL    RESET_COUNTER           ;Reset time-out counter
        PUSHF                           ;Simulate INT 10 with PUSHF and CALL
        CALL    ROM_VIDEO_IO_INT        ;Do VIDEO_IO function
        OR      AH,AH                   ;Asking for set-mode function?
        JNZ     NOT_MODE_SET            ;No, then return
        CALL    SET_CURSOR_MODE         ;Yes, then set cursor mode to default

NOT_MODE_SET:
        IRET
    INTERCEPT_VIDEO_IO  ENDP

;-------------------------------------------------------------------------;
;  This procedure initializes the interrupt vectors.                      ;
;-------------------------------------------------------------------------;
INIT_VECTORS    PROC  NEAR
        ASSUME  DS:VECTORS
        MOV     AX,VECTORS              ;Set up the data segment for vectors
        MOV     DS,AX
        CLI                             ;Don't allow interrupts
        MOV     AX,TIME_OF_DAY_
                VECTOR                  ;Save addresses of BIOS routines
        MOV     ROM_TIME_OF_DAY_INT,AX
        MOV     AX,TIME_OF_DAY_VECTOR[2]
        MOV     ROM_TIME_OF_DAY_INT[2],AX
        MOV     TIME_OF_DAY_VECTOR, OFFSET INTERCEPT_TIME_OF_DAY
        MOV     TIME_OF_DAY_VECTOR[2],CS

        MOV     AX,KEYBOARD_INT_VECTOR
        MOV     ROM_KEYBOARD_INT,AX
        MOV     AX,KEYBOARD_INT_VECTOR[2]
        MOV     ROM_KEYBOARD_INT[2],AX
        MOV     KEYBOARD_INT_VECTOR, OFFSET INTERCEPT_KEYBOARD_INT
        MOV     KEYBOARD_INT_VECTOR[2],CS

        MOV     AX,VIDEO_IO_VECTOR
        MOV     ROM_VIDEO_IO_INT,AX
        MOV     AX,VIDEO_IO_VECTOR[2]
        MOV     ROM_VIDEO_IO_INT[2],AX
        MOV     VIDEO_IO_VECTOR, OFFSET INTERCEPT_VIDEO_IO
        MOV     VIDEO_IO_VECTOR[2],CS

        MOV     AX,TIMER_DELAY          ;Set the delay to 3 minutes
        MOV     THREE_MIN_ COUNTER,AX

        STI                             ;Allow interrupts again
        CALL    SET_CURSOR_MODE         ;Set cursor mode to default
        MOV     DX,OFFSET INIT_VECTORS  ;End of resident portion
        INT     27H                     ;Terminate but stay resident
INIT_VECTORS    ENDP

CODE_SEG        ENDS

        END     BEGIN
```

Listing 2. ▲

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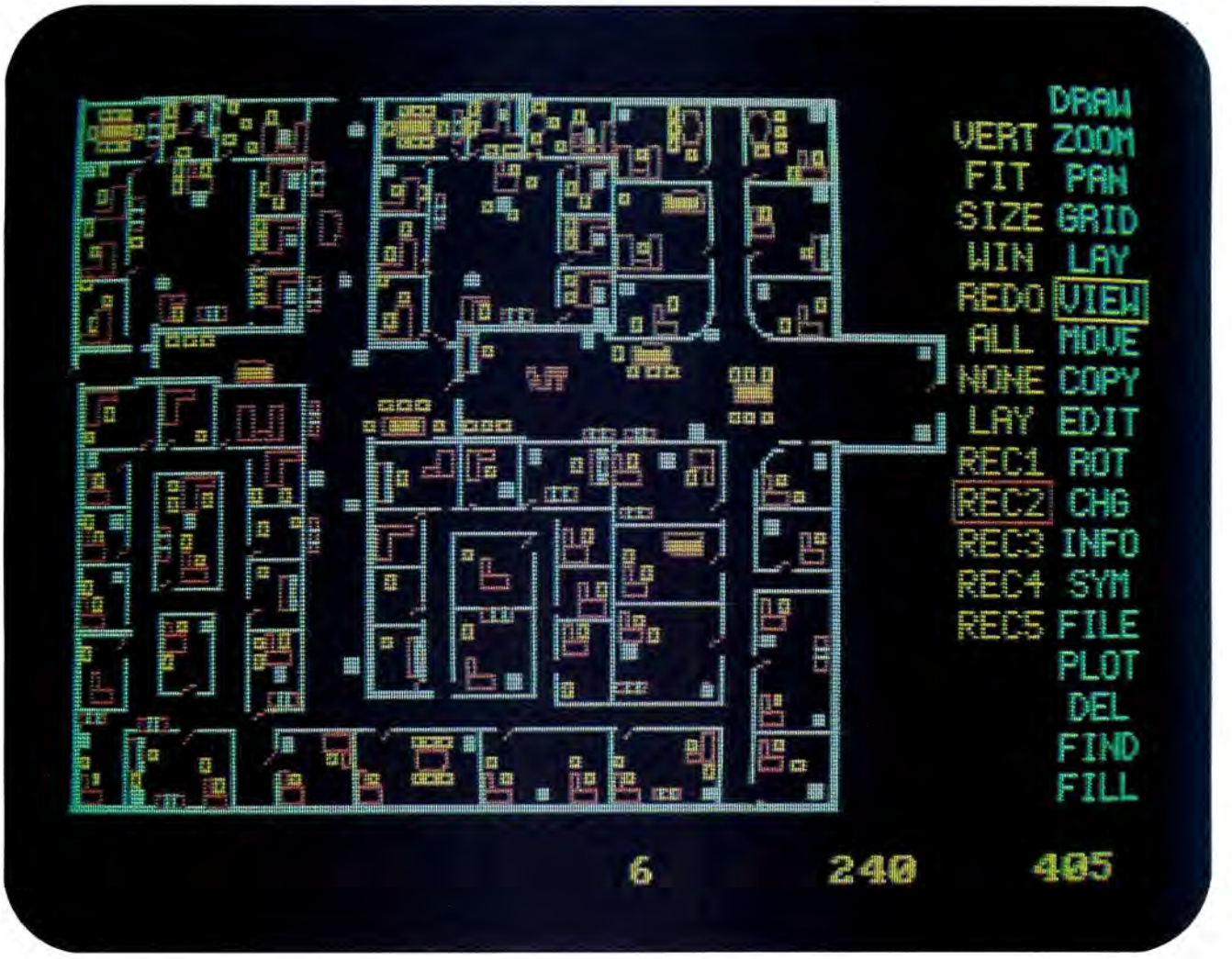

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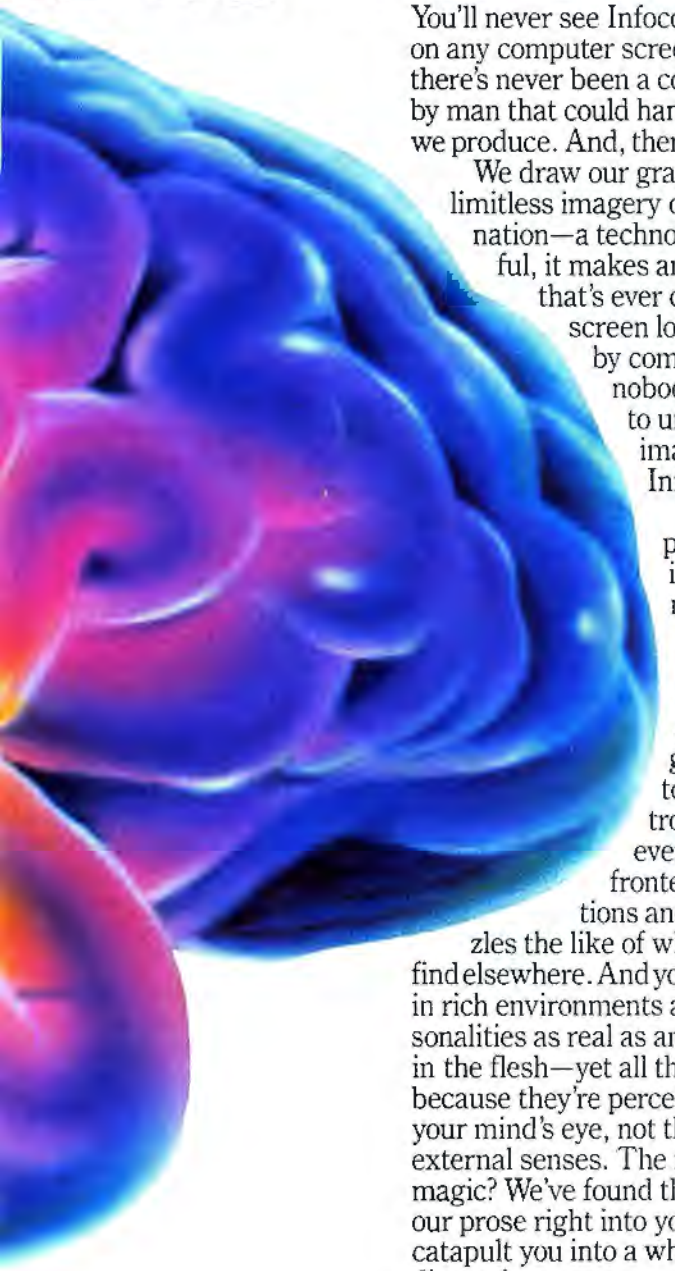

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MICRO FINANCE

by Ken Landis

The *Permanent Portfolio Analyzer*

This month we turn our attention to a new subject for this column—investing in the stock market. In addition to being one of the country's most common forms of investing, the stock market is also probably one of the most misunderstood. And yet, if you're the so-called average American, you own stock.

The stock market is as volatile as a runaway nuclear reactor. Price movements that years ago were considered frightening are commonplace today. Is it any wonder that there seems to be a high correlation between stock ownership and sleepless nights and headaches? How can the investor cope? It's not easy. And unless you've got time to sit by a Quotron machine constantly, taking the market's pulse and adjusting your holdings accordingly, chances are you'll get caught with your proverbial pants down at least once in a while.

One way investors attempt to cope is by formulating an investment strategy that takes into account not only changes in the market but also changes in inflation. As Britannia once ruled the waves, so inflation rules the markets. Good news about inflation is good news for the markets and for investors, and bad news about inflation is bad news for—well, you get the picture.

This month we'll use the Harry Browne investment strategy and the *Permanent Portfolio Analyzer* from C.R. Hunter & Associates (Cincinnati, OH) to analyze the effects of inflation on a diversified portfolio.

So who is Harry Browne? Browne is an investment adviser who in 1970 wrote the book *How You Can Profit from the Coming Devaluation*. This book attracted considerable attention in financial circles and put Browne and his theories in the limelight. Among Browne's later books are *Inflation-Proofing Your Investments* (from which the *Portfolio Analyzer*'s theories are taken and which he co-wrote with Terry Coxon), *Complete Guide to Swiss Banks*, and *New Profits from the Monetary Crisis*.

In 1974, Browne began publishing *Harry Browne's Special Reports*, an investment newsletter. The September 23, 1981, issue, which comes with the *Portfolio Analyzer* software, describes the Browne method for creating a permanent portfolio. What is a permanent portfolio? It's a portfolio that's designed to survive and flourish under the ravages of inflation.

The theory is quite simple. By balancing the assets in your portfolio to achieve what can be called the permanent mix, you can eliminate the necessity to trade assets in and out of your portfolio in an attempt to increase your future purchasing power (which is directly related to your profits). If your profits as a percentage of your portfolio are greater than the rate of inflation, you are making money; if they are lower, you are actually losing purchasing power and, hence, you are losing money.

The major premise underlying Browne's strategy and this software is that over the next ten years the economy will be dominated by one of five states of inflation. The five possibilities Browne suggests are (1) that inflation will level off somewhere around the level it's at now; (2) that it will continue to rise, but in surges, as it has historically; (3) that it will become uncontrollable and runaway; (4) that it will slowly ease down to a very low rate; and (5) that there will be a sudden and traumatic deflation, leading to negative price changes.

Based on the scenario you choose, the *Permanent Portfolio Analyzer* forecasts your portfolio's value and condition ten years into the future. The software is set up to use Browne's own assumptions about inflation, future prices, and the proper composition for a portfolio, but you can alter it to reflect your own assumptions if you disagree with his numbers or want to test an alternate hypothesis. In addition, you can execute "what-ifs" by changing the information about the composition of your portfolio.

If you have no portfolio, the program gives you the opportunity to choose between two strategies—balanced or go-for-broke—and to specify the inflation condition you expect. It then creates a portfolio for you based on those choices. The program has even anticipated the need for a portfolio based on an uncertain inflation state.

All this adds up to a program that sounds like a powerful, useful investment tool. Let's see if it is. To test the *Permanent Portfolio Analyzer*, we'll work with the portfolio of Mr. John Doe; it is his portfolio that's used in the example provided in the program documentation. But first, some more information about the package.

As an aid to the investor, the *Permanent Portfolio Analyzer* comes with a set of data-entry sheets that cover the investment categories chosen by Browne. These categories are gold bullion, gold options, silver bullion, silver coins, Swiss francs, Swiss francs with interest, stocks, leveraged stocks, put options, real estate, collectibles, cash, treasury bills, other short-term dollar holdings, treasury bonds, other long-term dollar holdings, short-term dollar debt, long-term dollar debt, and other investments.

The first thing you're likely to notice about this list is that, besides covering the major forms of investment we might consider, including currency, it also lists debt as an investment. The program considers the advantages or disadvantages of borrowing both short and long term under the economic scenario you choose. Analysis may reveal that it would be advantageous for you to redeploy your assets to adjust your borrowings. Unfortunately, this analysis does not keep account of the tax considerations that such a redeployment would involve.

Each portfolio can hold up to two hundred items. For a majority of users, this is plenty of capacity, but if you have large, diversified portfolios, you may find the two-hundred-item-per-portfolio limitation a problem. If this is the case, you'll have to develop a classification scheme to divide your portfolio into manageable parts and then do some manual consolidations.

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THE PERMANENT PORTFOLIO ANALYZER ENTRY SHEET

PORTFOLIO NAME: John Doe

CATEGORIES AND CATEGORY ITEMS		QUANTITY		CURRENT PRICE PER UNIT ($)	PURCHASE PRICE PER UNIT ($)
1-GOLD BULLION					
ITEM 1-	Bullion ('78)	32.15	(OZ)	305	187.50
ITEM 2-	Bullion ('79)	96.45	(OZ)	305	238
ITEM 3-	Krugerrands	50	(OZ)	305	369.50
ITEM 4-			(OZ)		
2-GOLD OPTIONS					
ITEM 1-			(CONT)		
ITEM 2-			(CONT)		
ITEM 3-			(CONT)		
ITEM 4-			(CONT)		
3-SILVER BULLION					
ITEM 1-	Bullion	803.75	(OZ)	5.15	10.40
ITEM 2-			(OZ)		
ITEM 3-			(OZ)		
ITEM 4-			(OZ)		
4-SILVER COINS					
ITEM 1-	U.S. 90%	1	(BAGS)	5810	10850
ITEM 2-			(BAGS)		
ITEM 3-			(BAGS)		
ITEM 4-			(BAGS)		
5-SWISS FRANCS					
ITEM 1-	Current Account	1000	(FR)	.48	.59
ITEM 2-			(FR)		
ITEM 3-			(FR)		
ITEM 4-			(FR)		
6-SWISS FRANCS W/INTEREST					
ITEM 1-	7% bonds of '83 (10)	10000	(FR)	.48	.59
ITEM 2-	5% bonds of '86 (10)	10000	(FR)	.48	.54
ITEM 3-			(FR)		
ITEM 4-			(FR)		
7-STOCKS					
ITEM 1-	Apple Computer	2000	(SH)	22	18
ITEM 2-	General Electric	1000	(SH)	63 1/2	55 1/4
ITEM 3-	Louisiana Land	800	(SH)	27 3/4	36
ITEM 4-	Federal Express	600	(SH)	45 1/2	49 3/4

Figure 1.

Doe's first step is to gather data on his portfolio. He'll need to put together a complete list of all his investments, their purchase prices, and their current market values. The completed data-entry sheets for his portfolio are shown in figure 1.

Once you've transferred PC-DOS onto the program disk and taken care of some other housekeeping chores that are clearly explained in the documentation, you're ready to enter your own data. It's very easy to enter, verify, and edit data within the program.

When you finish entering your portfolio information, the program displays a list of all portfolios currently stored on the data disk and asks what name you want to store this portfolio under. The name you choose must fit within the parameters of PC-DOS; in other words, it must be no longer than eight characters, must contain no periods or commas, and so on. If you choose a name that's already on disk, the program double-checks to be sure you really want to overwrite the existing file.

To perform its analysis, the program uses a series of tables containing Browne's assumptions about the future. Investors must ask themselves what the foundations of these assumptions are. Did Browne pull them out of the air, or are they the result of a thorough quantitative analysis? The *Permanent Portfolio Analyzer* does only rudimentary math on the information that's entered into it; the assumptions used by the program are the key. If you disagree with these assumptions and decide to use your own, you must be willing to do the work required (which may be substantial) to develop realistic and practical alternatives.

The information contained in the tables includes assumptions about inflation over the next ten years, today's prices for the various investment categories, future prices for those categories, targeted portfolio compositions under the various inflation assumptions, and details about Browne's assumptions under a go-for-broke investment strategy. As mentioned, the investors can change any of this information to reflect their own assumptions or to update the program should Browne's assumptions change. Hurrah. Finally a program—which is essentially a decision-generator—that admits that it might not always be right and that things can change. When they do and the author's assumptions also change, all registered owners will be notified of the changes so that they can update their tables accordingly.

For the final category—other investments—it's not possible for Browne or the program author to guess what your other investments might be. Thus, you must enter your own assumptions about these investments in the tables that contain assumptions about present and future prices. As mentioned, you're likely to find forecasting the future a difficult task, but the validity of your analysis rests heavily on your ability to do so, especially if the investments in this category make up a large portion of your portfolio.

Let's return for a moment to our hypothetical investor, John Doe. The first report Doe runs produces a balance sheet and an evaluation of his portfolio. For this report to be accurate, all the current price information

<<< THE PERMANENT PORTFOLIO ANALYZER >>>

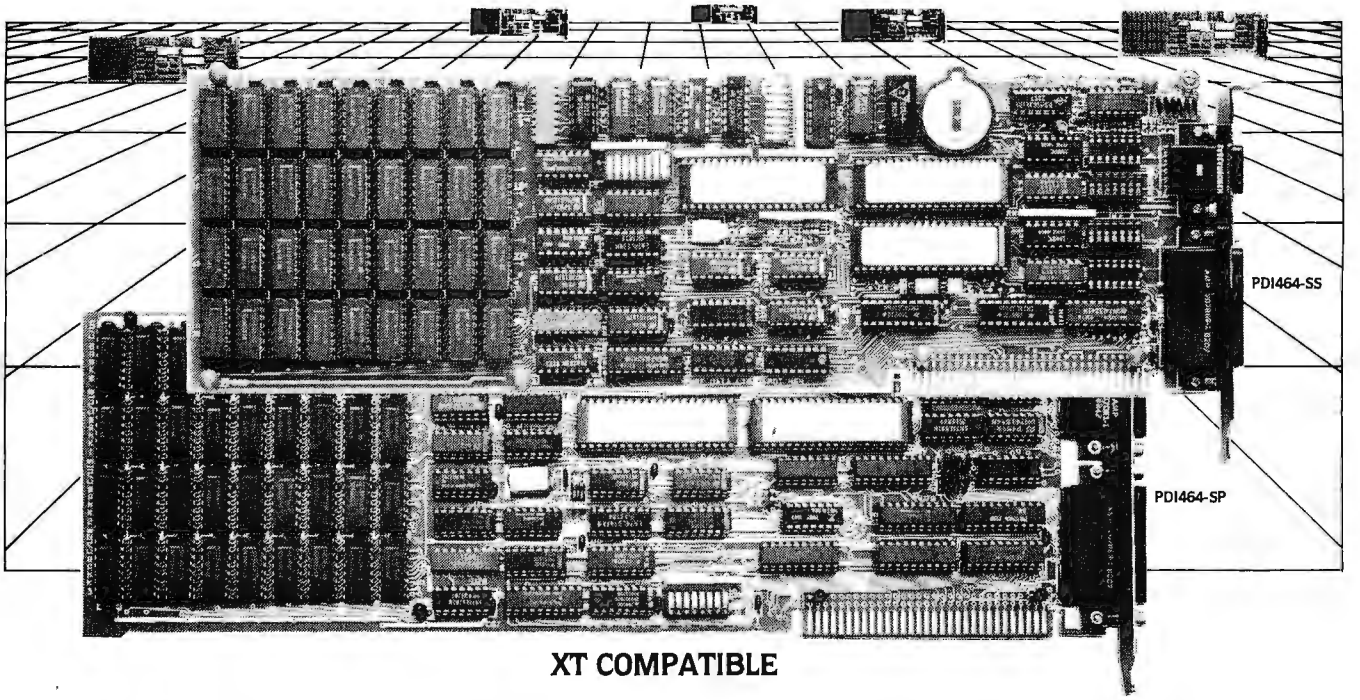
CURRENT PORTFOLIO BALANCE SHEET AND EVALUATION

JOHN DOE PORTFOLIO — JULY 4, 1982

PORTFOLIO HOLDINGS (ITEMS)	NUMBER OF UNITS (#)	CURRENT PRICE PER UNIT ($)	CURRENT MARKET VALUE ($)	CATEG. SHARE (%)	PURCHASE PRICE PER UNIT ($)	TOTAL PURCHASE PRICE ($)	UNREALIZED GAIN/LOSS (+) (-)	CHANGE (%)	OVER 30% CHNG
1-GOLD BULLION (OZ):									
BULLION ('78)	32.15	305.00	9,806	1.84	187.50	6,028	3,778	62.67	*
BULLION ('79)	96.45	305.00	29,417	5.51	238.00	22,955	6,462	28.15	
KRUGERRANDS	50.00	305.00	15,250	2.86	369.50	18,475	-3,225	-17.46	
TOTAL GOLD BULLION			54,473	10.21		47,458	7,015	14.78	

Figure 2.

Plug some Pure Data into your PC!



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contained in the portfolio must be current.

Figure 2 shows one part of this report—the first item, gold bullion. The majority of the report is a recap of the portfolio investment information entered earlier. However, the report also contains computations that tell what percentage of your portfolio each investment makes up (category share) and the unrealized gain or loss on the investments. It also flags any item that has changed in value more than 30 percent.

The 30 percent change mark has a special significance in the Browne investment strategy. Browne believes that whenever any asset in the portfolio has appreciated or depreciated 30 percent, the entire portfolio should be adjusted to bring the item percentages back in line. We can call this process "repermanentizing." Mathematically, the report is not complicated; the results it provides could easily have been generated by a spreadsheet program. Therefore, this report alone is not sufficient to warrant your shelling out $295. Let's see whether the next report—the ten-year forecast—is.

The ten-year projection shows the forecasted condition of your portfolio ten years hence based on the inflation (economic) condition you chose and the composition of your portfolio today. The report also shows the targeted share of your portfolio that a given item should be according to Browne, what share it is, and the dollar amount required (or liberated for other use) that would bring that item to the target level. The gold bullion section of the ten-year projection analysis is shown in figure 3.

<<< THE PERMANENT PORTFOLIO ANALYZER >>>

PORTFOLIO TEN-YEAR PROJECTION ANALYSIS

JOHN DOE PORTFOLIO — JULY 4, 1982

EXPECTATION: RISING INFLATION

PORTFOLIO HOLDINGS (ITEMS)	NUMBER OF UNITS	CURRENT PRICE PER UNIT ($)	CURRENT MARKET VALUE ($)	CATEG. SHARE (%)	TARGET SHARE (%)	TARGET VALUE ($)	DIFFERENCE TO BE BOUGHT/SOLD (+) (-)	PROJECTED VALUES OF FUTURE PURCHASING POWER: FUTURE P.P. CURRENT HOLDINGS ($)	FUTURE P.P. TARGET HOLDINGS ($)
1-GOLD BULLION (OZ):									
BULLION ('78)	32.15	305.00	9,806	1.84					
BULLION ('79)	96.45	305.00	29,417	5.51					
KRUGERRANDS	50.00	305.00	15,250	2.86					
TOTAL GOLD BULLION			54,473	10.21	35.00	186,718	132,245	115,114	394,577

Figure 3.

At first glance, this report appears similar to the current portfolio balance and evaluation report (part of which is shown in figure 2). The number of units, current price per unit, current market value, and category share columns are based on information entered by the investor. The target share column is based on Browne's assumptions, which, as we've said, are contained in a table within the program. The target value is computed using Browne's recommended percentage for the item, based on the current total value of the portfolio.

Let's use John Doe's portfolio as an example. Doe's portfolio is worth $533,481; therefore, the recommended gold component of his portfolio is 35 percent of $533,481, or $186,718. The difference to be bought or sold is simply the difference between the current dollar amount of the items in the portfolio and the calculated recommended amount. If there's a shortage, the program tells the investor how much more of that item needs to be bought; if too much of an item is owned, the program tells how much must be sold. Note: This information should be used only as a guide to decisions, not as a strict indicator of what decision should be made.

Neither the program nor the strategy expects you to increase your investments; it only suggests that you rearrange them. There are, however, two obvious problems here. First, if you need to change the structure of your portfolio, you're bound to encounter some costs, such as brokerage fees and commissions. That means you'll need either to invest more or liquidate part of your portfolio to cover these costs. Second, if your home is worth $120,000 and the *Permanent Portfolio Analyzer* tells you that you should own only $90,000 worth of real estate, should you sell off only $30,000 worth of your home? Of course not. Obviously a simplification of assumptions had to be done in order to make the analysis possible. It is the investor's ultimate responsibility to realize that common sense and judgment are required to make this, or any other investment strategy, work.

Up to this point, the ten-year-projection report simply has shown us what we own today and what Browne would recommend that we own. Again, we could just as easily have done these calculations on a spreadsheet. It is the last two columns of this report that constitute the crux of the *Permanent Portfolio Analyzer*'s analysis. For it is here that we learn the forecasted future value of our portfolio.

Based on the scenario chosen (in this case, rising inflation), the program forecasts the future purchasing power of our present portfolio alongside that of Browne's target portfolio. The future purchasing power of both portfolios is expressed in today's dollars. Thus, referring once again to Doe's portfolio, we find that on July 4, 1992, the present-day purchasing power of his present portfolio will be $605,813, while Browne's target portfolio, which began with the same dollar amount invested, will have a purchasing power of $783,137. That's a $177,324 difference.

What accounts for this difference? Well, according to Browne's strategy, a permanent portfolio (permanent in accordance with his theories) will appreciate more than a nonpermanent portfolio. The question you must ask yourself is, "Do I agree with the strategy—that is, with the portfolio balance Browne recommends, and with his assumptions about the future?"

If you do agree, great. The *Permanent Portfolio Analyzer* is a well-written, beautifully documented software package that should be of great help to you in implementing the strategy it embodies. If you don't agree with Browne's theories and assumptions, then your first reaction, understandably, will probably be that the program isn't even worth considering. While this is a logical way to feel, it's also true that a great deal about forecasting future values can be learned from this program. The methodology used to analyze the permanent portfolio is a good, clean representation of price-forecasting techniques—uncomplicated but complete. So if you disagree with Browne's numbers but agree with the variables used in the analysis, you could certainly consider this program a viable alternative to writing your own package on a spreadsheet.

Should you consider doing this analysis on a spreadsheet? There are two sides to this question. On the "buy the software" side, the *Permanent Portfolio Analyzer* is a well-executed, well-written, well-documented package, and as far as we can tell it's error-free. And, of course, it walks you through the analysis, which a spreadsheet package would not. In addition, building a spreadsheet model to run Browne's analysis would require considerable time and effort. On the "use a spreadsheet" side, there's the fact that using a spreadsheet would allow you to enter your own assumptions into the analysis easily and to put more information on a report.

Your own beliefs, assumptions, and needs are what will determine whether the *Permanent Portfolio Analyzer* is a program you should buy. So, too, the question of whether to buy the software or use a spreadsheet in your analysis is one only you can answer. ▲

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WHAT THE PROGRAM IS

ThinkTank is an 'idea processor' for your IBM PC personal computer, an outline editor with powerful features. It allows you to deal with the thoughts in your mind by providing a simple, versatile way of outlining, arranging and modifying text. Integrated into ThinkTank is a powerful, easy to use word processor.

HOW ThinkTank WORKS

You enter topics in 'headline' form—and then indent headlines under each other to create an outline format. With single keystrokes you change your outline to reflect new thoughts. You can put a page of text under your headline—when you move the headline the text goes with it.

You can sort alphabetically, or search for key words or phrases. You can 'expand' to reveal hidden detail or 'collapse' any part on the screen to see the big picture. You can edit and print it out.

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CAPTAIN'S LOG, U.G.A.S. *ATLANTIS*

Date 5106.2: *We emerged from hyperspace surrounded by four Krellan destroyers. GENERAL QUARTERS! We immediately engaged battle and fired off five torpedoes.*

Date 5106.3: *We destroyed two Krellan vessels and disabled a third, but a Zaldron warship arrived. We are laying mines since their invisibility screen makes our sensors useless.*

Date 5106.6: *Sensors indicate a large explosion. The Zaldron has struck a mine! Our tractor beam has the disabled Krellan ship in tow and our space marines are being transported aboard to effect capture.*

Date 5107.0: *Our boarding party was repulsed with heavy casualties. INTRUDER ALERT! The Krellans retaliated by beaming a sabateur aboard. An explosion on Deck 7 damaged our primary life support system. Have initiated a search and put Deck 7 on max security.*

Date 5107.6: *Krellan vessel finally captured by the marines and prisoners were taken. Received top priority orders to rescue Starbase 3 which is under attack by a Krellan fleet. Crew at battle stations--engaging hyperdrive.*

Date 5107.9: *COLLISION! Course intercepted by Krellan. POINT BLANK HIT! Have lost shield 1 and suffered massive damage and casualties. Engineering reports our backup life support system is failing. Cannot survive another attack or reach starbase! We must escape ... but HOW?!*

Membership in the **FLEET** is available for only $49.95, suggested retail price, at your computer software store, or send check or money order, plus $2.00 for postage and handling, to: **CYGNUS, STAR FLEET I,** P.O. Box 57825, Webster, Texas. 77598 Tel: (713)486-4163 Dealer inquiries welcome.

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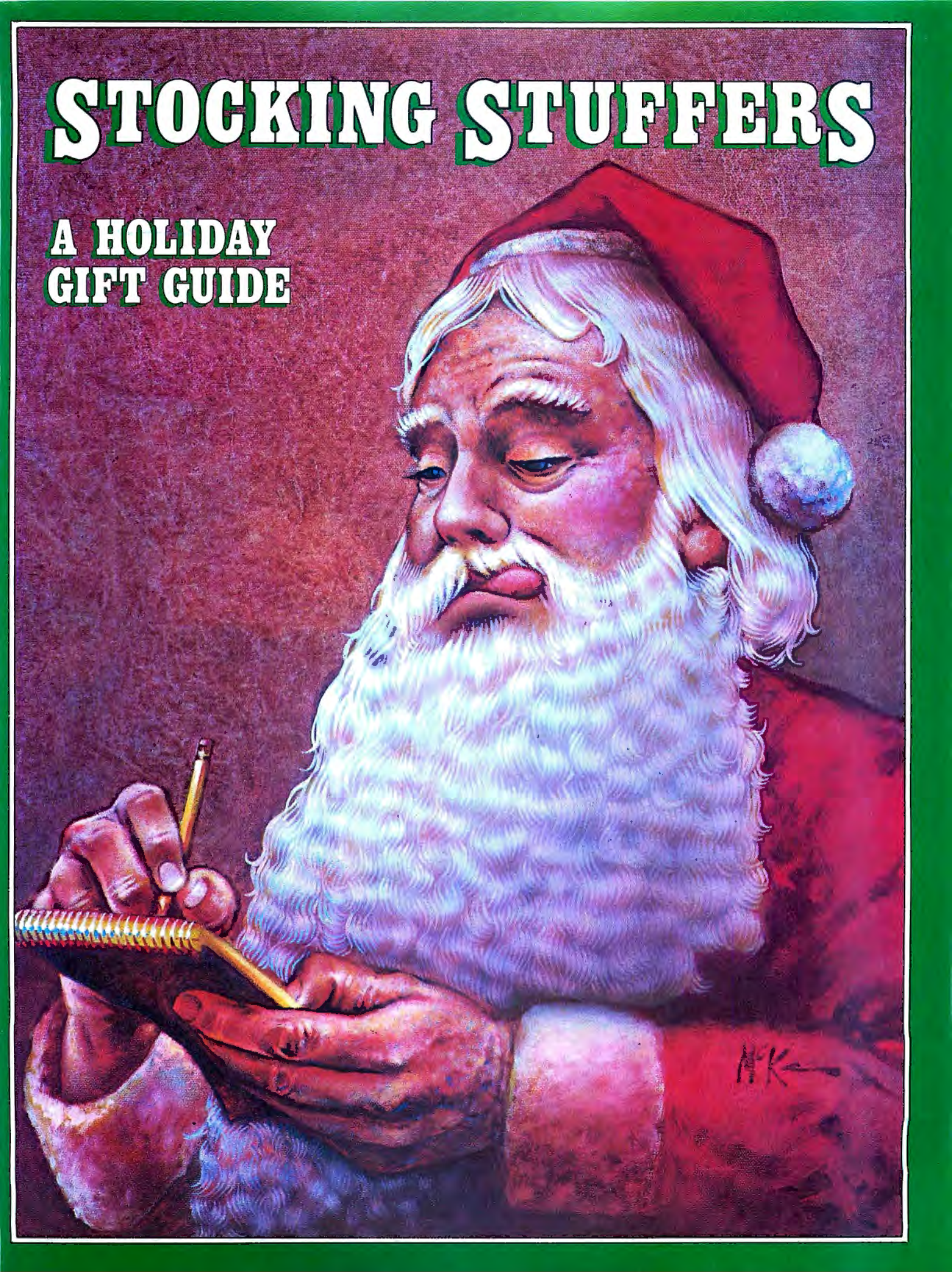
STOCKING STUFFERS

A HOLIDAY GIFT GUIDE



STOCKING STUFFERS

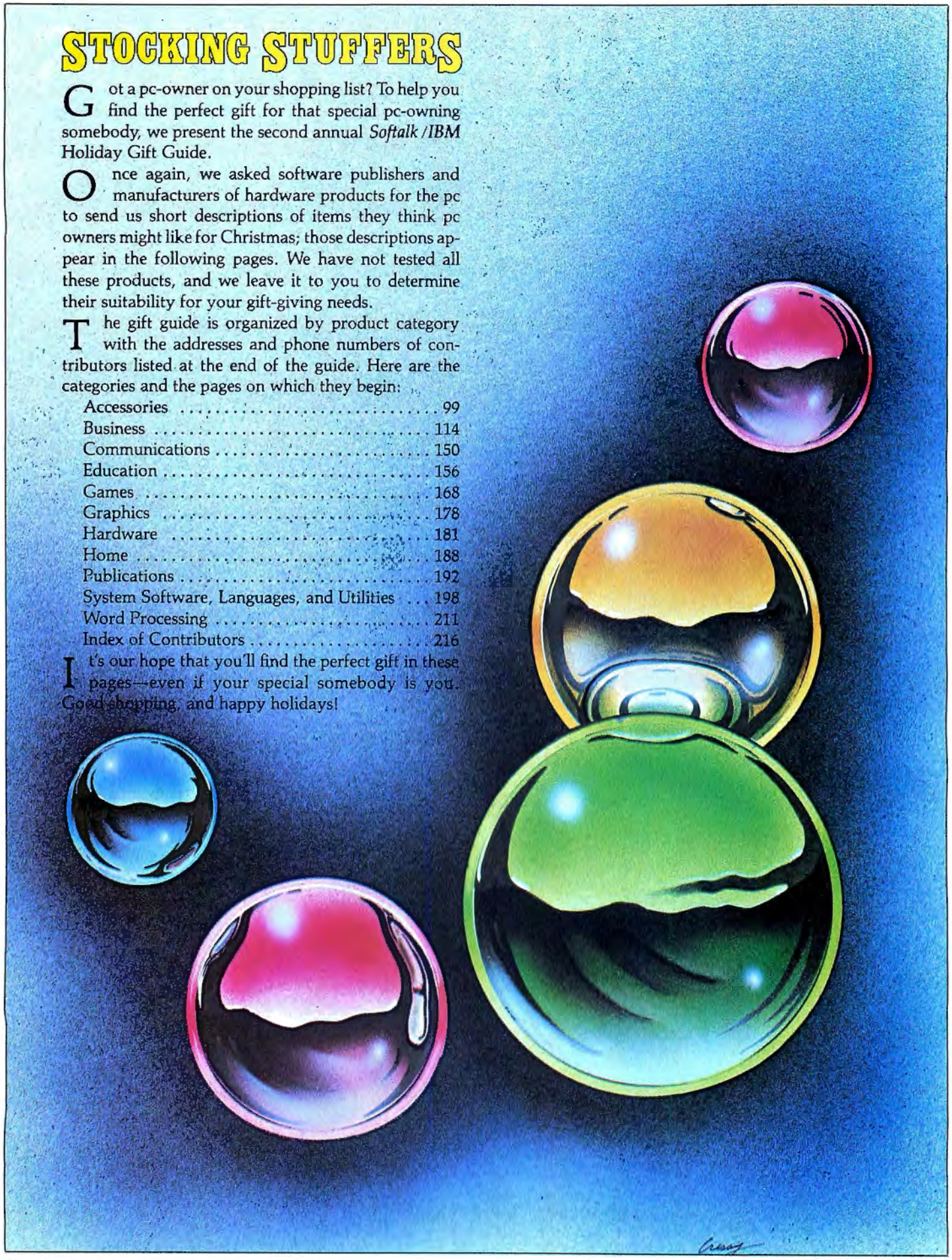
Got a pc-owner on your shopping list? To help you find the perfect gift for that special pc-owning somebody, we present the second annual *Softalk /IBM* Holiday Gift Guide.

Once again, we asked software publishers and manufacturers of hardware products for the pc to send us short descriptions of items they think pc owners might like for Christmas; those descriptions appear in the following pages. We have not tested all these products, and we leave it to you to determine their suitability for your gift-giving needs.

The gift guide is organized by product category with the addresses and phone numbers of contributors listed at the end of the guide. Here are the categories and the pages on which they begin:

Accessories 99
Business 114
Communications 150
Education 156
Games 168
Graphics 178
Hardware 181
Home 188
Publications 192
System Software, Languages, and Utilities ... 198
Word Processing 211
Index of Contributors 216

It's our hope that you'll find the perfect gift in these pages—even if your special somebody is you. Good shopping, and happy holidays!



ACCESSORIES

AbCom Corp.
Bishop, CA

PC Covers. These protective covers are for either the IBM keyboard or the system unit and monochrome monitor. Constructed of urethane-coated pack cloth with double-stitched seams, these covers are available in navy, brown, or silver. Other cover combinations are also available. Keyboard cover, $9.70. System unit and monitor, $20.45.

Alpha Delta Communications, Inc.
Centerville, OH

Master AC Control Console. Features lightning spike and voltage surge protection with master and individual circuit switch control. Provides eight 120-volt AC outlets, three-stage 2,000-amp surge protectors, and lighted switches. UL listed. $79.95.

Amtek Systems, Inc.
Richardson, TX

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Apogee Designs, Ltd.
Baltimore, MD

Printer Stands. Features shelves for manuals and 4-in paper space. AP-216 (MX-80), $27.50. AP-221 (MX-100), $29.50.
Sound Control Stands. Includes a lid and acoustic foam to confine noise. AP-320 (MX-80), $79.50. AP-325 (MX-100), $89.50.
Two-Axis Monitor Stand. Swivels to put monitor at best viewing angle. All monitors. AP-430, $44.
Double-Bay Covered Disk Rack. Holds sixty 5 1/4-in disks. AP-505, $29.50.

Bretford Manufacturing, Inc.
Schiller Park, IL

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California Design Works
Monterey, CA

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Anaheim, CA

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ACCESSORIES

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Qwik-Kit. Includes *Qwik-Label,* a set of preprinted identifiers; *Qwik-Key,* a function key overlay card; and *Qwik-Guide,* a pair of rugged reference cards preprinted with important operating instructions. $7.75, plus .90 shipping.

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Data*Easy Software, Data Consulting Group
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Color Disks. Top-quality disks in red, green, yellow, blue, burgundy, silver, tan, brown, and orange in 5 1/4-inch and 8-inch. Call for prices.

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Diskfiles. Capacities of up to 125 disks for storage and filing. Compartments are separated by removable clear inserts. Five color-coded index tab *Diskus Dividers.* Stackable with disk drives, made of dark translucent acrylic. *Diskfile 125,* $59.95. *Diskus, Jr.* (75+ disks), $39.95.

The D.P. Consultant
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D/Punch Co.
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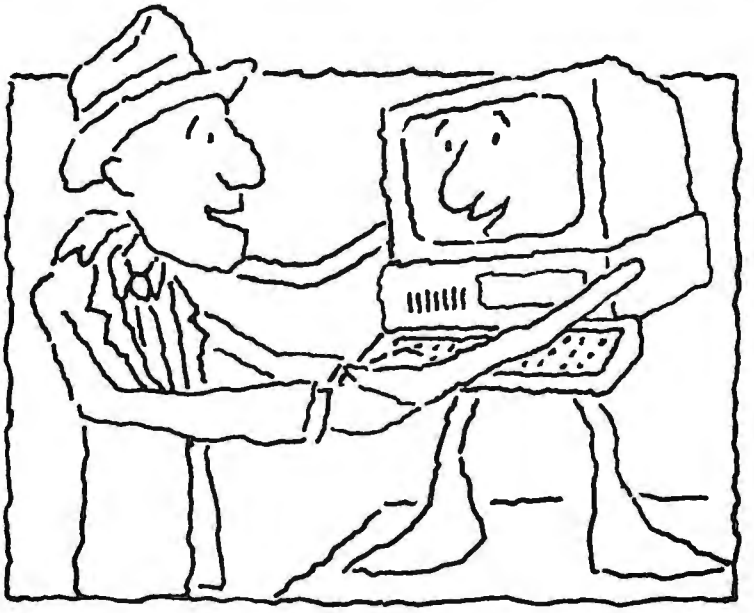
Introduce yourself to the IBM/PC with "HELLO CHARLIE"



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ACCESSORIES

Dust-Off System II. Computer cleaning and maintenance kit, contains *Dust-Off II* canister/valve combination, plus *Mini-Vac* and *Dual Extender* accessories. *Dust-Off II* enables users to improve computer performance, protect against head crash and dropouts, and reduce service/repair bills by blowing away loose dust and dirt. $42.50.

Fiberbilt Computer Cases
New York, NY

Flight Case. Offers complete protection with less weight. Rugged fibrex cases feature a heavy-duty aluminum frame coupled with steel corners and a fully foam-padded interior. Weigh less than 20 lbs. each. Case for the CPU and keyboard, $161. Case for monitor and an IBM or MX-80 printer, $171.

FineTech Furniture, Inc.
Woodbury, TN

Woodbury Series. Fine furniture, beautifully styled and finished, ergonomically designed and constructed of the finest solid red oak to house the pc. From $39 to $399.

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FMJ, Inc.
Torrance, CA

Computer Escort Stand. An all-steel welded shelf that raises the IBM above keyboard level allowing storage of the keyboard underneath the pc. Optional ball-bearing slide tray to facilitate use of keyboard on shallow desks. Color matched to the pc. $39.95.

Printer Pal. All-steel stand stores paper below printer for extra convenience and space. Includes paper guides, cable clip, and rubber feet. Models available for most printers. $29.95 for small printer, $39.95 for mid-size, and $54.95 for NEC Spinwriter and other large printers.

Giltronix, Inc.
Palo Alto, CA

The 5400 series parallel "Selecto-Switch." Centronics compatible. Enables printer sharing. Available with one I/O port and two or three communication ports. Switches thirty-six lines. Five-year limited warranty. $239 to $279.

The 5200 series RS-232C "Selecto-Switch." Enables port expansion and device sharing. Available with one I/O port and two to five communication ports. Switches twenty-four lines. Manual operation; no power required. Five-year limited warranty. $159 to $299.

Hi Tech
Santa Cruz, CA

Right Notch. Cuts a sharp, clean square notch in exactly the right place, allowing use of the reverse side of a disk for double the storage. $19.95.

Hollander Office Products, Inc.
Santa Paula, CA

Anti-static Dustcovers. For all office machines (computers, printers, CRTs, disk drives, typewriters). Made of clear plastic or cloth-backed vinyls in saddle tan or almond. $11.95 to $26.95 depending on machine.

Hooleon Co.
Cottonwood, AZ

Touchdowns. Eight enlarged keytops for the pc/XT. Backspace, return/enter, shift (2 keys), tab, 0/ins, ctrl, and alt. Nonglare *Keytops* fit over the tops of existing control keys, providing easier reach and bigger targets. In IBM gray or charcoal. $18.95 postpaid.

Hytek
Dayton, MD

The Computer Mug. A high-quality, wide-bottom mug with a spill-resistant top featuring DOS and Basic commands sealed within its thermal sides. pc color compatible. $9.95.

Information Access Corp.
Shalimar, FL

PC Companion. Pocket-size reference card for programmers. This handy card lists all of the 256 ASCII codes as implemented on the pc and the corresponding control code or special symbol. $1.

Intra Computer, Inc.
New York, NY

Printer X Switch. Permits businesses with two computers and two parallel printers (dot-matrix and daisy wheel) to direct either computer's output to either printer for word processing or graphics. Including printer cables, $220.

Four-Way Printer Sharing Switch. Permits four students to get listings from their classroom computers on a single parallel printer. Including printer cable, $260.

Printer Switch. Permits word processing computers and parallel printer port to toggle between high-speed dot-matrix and letter-quality daisy wheel. Including printer cables, $165.

I-Protect
Marina Del Rey, CA

I-Protect NonGlare Leaded Acrylic Filter. Nonglare antiradiation antiultraviolet static reduction image-enhancement filter. $99.95.

I-Protect Plain Leaded Acrylic Filter. Reduces radiation and ultraviolet emissions by ninety-seven percent. Reduces static charge by an average of eighty percent. Attaches with Velcro. $49.95.

The Iron-Interface Group
St. Louis Park, MN

IBM Shorty Cord. Special male and female ends necessary to power up IBM color monitors or Princeton color monitors (both with removable power cords) directly from the monitor power outlet on the back of the pc or XT with the main computer power switch. 18", $15.95. 36", $17.95, add $2 postage.

Cord and Cable Organizer. 6" by 12" by 4" wire frame that attaches to the underside of a computer table. Reusable plastic straps keep all the assorted cords, wires, and cables up in the basket and out of the way. Helps prevent accidental power disconnection. $14.95, plus $2 postage.

18-Inch Monitor Conversion Cord. This cord has the special male end that plugs directly into the monitor power outlet on the back of the pc or XT, and a standard three-prong female plug on the other end. Allows user to turn on non-IBM or IBM color monitors with the main computer power switch. $15.95, $2 postage.

John James Furnishings
Houston, TX

Hardwood Computer Furnishings. The *Compu-Corner* line, a modular furnishing system, offers many options and allows for custom configurations. The *Comp-u-Mate* line consists of all-wood or laminate workstations and matching printer stands. Also

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Introducing... SixPakPlus,™ the refreshing new 384KB multifunction card! In response to the changing needs of the IBM PC and PC-XT marketplace, AST Research, Inc. is proud to announce the latest addition to our line of multifunction enhancement products, the **SixPakPlus**! This new product is the result of extensive marketing research into the needs of IBM PC users whether they have the original 64K system board, the newer 256K system board, or the PC-XT. The **SixPakPlus** has been engineered to meet these needs at a competitive price while maintaining AST's high standards for quality and reliability.

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3. One Parallel (printer) port, configurable as LPT1 or LPT2 (LPT2 or LPT3 when the IBM monochrome card is installed), for use with the IBM/Epson and other compatible printers. The port is compatible with IBM diagnostics.

4. A Clock-Calendar with battery backup, featuring an easily replaceable Lithium battery and a quartz-controlled timebase for a high degree of accuracy.

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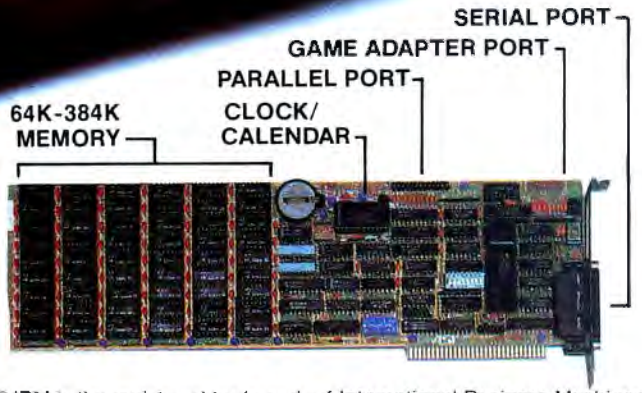

Most important of all, the **SixPak** comes with the AST "Plus," AST's unsurpassed reputation for quality, reliability, after-the-sale support, and overall design excellence that gives our products the best price/performance ratio in the industry! Hence the name, **SixPakPlus**!

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64K-640K bytes

Microprocessor
16-bit, 8088

Auxiliary Memory
2 optional internal diskette drives, 5¼" 160KB/180KB or 320KB/360KB per diskette

Keyboard
83 keys, 6 ft. cord attaches to system unit
10 function keys
10-key numeric pad

Diagnostics
Power-on self testing
Parity checking

Display Screens
Color or monochrome
High-resolution
80 characters x 25 lines
Upper and lower case

Operating Systems
DOS, UCSD p-System, CP/M-86†

Languages
BASIC, Pascal, FORTRAN, MACRO Assembler, COBOL

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9 x 9 character matrix

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Graphics mode:
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Black & white resolution: 640h x 200v
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available, retail computer outlet merchandising, which consists of fixtures, display cases, and design services. *Comp-u-Corner*, $399. *Comp-u-Mate*, $199.

Kraft Systems Co.
Vista, CA

Paddle Pairs. Feature an optimum 185-degree knob rotation for faster operator response and higher scores. Contain custom potentiometers designed specifically for the pc, thereby assuring higher resolution and accuracy with no "hop." One pair, $49.95.

Precision Joystick. Plug-in compatible with the pc. Features "spring-centering" and "free-floating" stick modes selectable by switching external toggle switches on the bottom of the case, trim controls on each axis, and a full one-year warranty. Offers versatility for both business and games applications. $69.95.

LinTek, Inc.
Grand Rapids, MI

The Monitor Mover. Adjustable mechanical arm that holds the computer display off the user's desk, freeing up work space. Adjusts in four ways to provide complete flexibility of placement in the work area. Features all steel construction, off-white urethane finish. $129.95.

The System Sidekick. Holds the computer system off the work area at the side of the desk. The system stays near the operator yet conveniently and securely out of the way. Clamps to most desks. $79.95.

LoTech Ltd., Inc.
San Francisco, CA

Patch Computer Bug Spray. Makes a perfect holiday gift for people who have everything, or have had it with their computers. While "The Pet of Silicon Valley" may not get the bugs out of your system, it will remove grime from most video display screens. The product includes tongue-in-cheek directions, laced with heavy doses of computer jargon and "disk-claimers." $5.95.

Luxor Corp.
Waukegan, IL

Model LE-MSS. 18" by 24" table with adjustable sliding keyboard shelf provides mobile storage for computers with detached keyboards. 4" casters, two with brakes. $119.

Metafab/Microcomputer Division
Hillsboro, OR

Microbridge-1 and *Microbridge-2.* Durable steel printer stand. Slotted for bottom feed printers, if needed. Creates storage space underneath printer paper supplies. Textured and finished in neutral beige. *MB-1* (for 80-column printers), $29.95. *MB-2* (for 132-column printers), $33.95.

Microcomputer Accessories, Inc.
Los Angeles, CA

CRT Cover. A protective cover for the pc monochrome or color monitor. Made of heavy-gauge, flexible vinyl that is sewn with white seam binding. $15.

Keyboard and Disk Drive Covers. Preserve the sleek silhouette of the pc while shielding vulnerable areas from dust and dirt. The keyboard cover is durable smoke-tinted acrylic. The drive cover blends with the IBM's styling and has a cushioned edge that forms a dirt-proof seal. Both dust covers, $22. Keyboard cover, $12. Disk drive cover, $10.

The Keyboard Storage Drawer. Turns narrow surfaces such as credenzas or typewriter returns into computer workstations. Features a 3 1/2" high, 18-gauge steel support unit upon which the system is placed. A sliding cantilever drawer holds the keyboard, extends to a locked position, and becomes an 11" work platform with a wrist-rest pad. $89.

The Keyboard Storage Stand. Consists of the 3 1/2" high, heavy-duty steel frame. It supports and raises the system and CRT, providing keyboard storage underneath. $44.

The Manual Easel. Made of thick bronze-tinted acrylic with an extra-wide lip. It makes pc and software manuals easy to use by propping them up at a comfortable viewing angle. Has protective pads to prevent skidding. $20.

Printer Covers. Protective dustcovers for the Epson MX/FX 80 printer (PC720) and for the Epson MX100 printer (PC730). Made of heavy-gauge, flexible vinyl that is sewn with white seam binding. PC720, $13. PC730, $17.

The Printer Stands. Available in two sizes, elevate the printer for smooth paper feed and storage. Made of reinforced 20-gauge steel, with a baked-enamel finish and felt pads on the bottom to reduce noise and vibration, they will support up to 100 lb. without bowing. The Printer Stands are available for paper 8 1/2" wide and for paper 14 7/8" wide. Both sizes are also available with bottom slots to accommodate bottom-feeding printers. $25 and $30.

The Rolltop 100 Disk File. Makes storing and locating floppy disks easy. Holds 100 5 1/4" disks and includes ten index tab/dividers to keep programs organized. Constructed of textured gray unbreakable ABS plastic with a tambour door of baked-on bronze enamel paint and antiskid feet. $36.

The Tilt'n Turn. A CRT display stand that allows computer users to reduce screen glare, eye strain, and neck craning. Features a tension spring which allows completely stable movement, 30-degree tilting and 360-degree turning, without removing the CRT. Will fit any CRT with feet separation less than 11" wide and 10 1/4" deep. $40.

The Under Carriage Platform Drawer. Performs the same function as the *Keyboard Storage Drawer,* but the sliding cantilever drawer is modified to suspend under the top of a desk, shelf, or tabletop. It requires a 3 1/4" by 21" clearance. Fully extended, the platform drawer places the keyboard at a very comfortable typing height. $54.

Micro Format
Buffalo Grove, IL

Micro Format Starter Kit. Includes 500 sheets blank letterhead, 500 continuous address labels, 500 continuous index cards. $24.

MF 850. Blank continuous mailing labels. Label size 5" by 2 15/16". 500 labels per package. $19.50.

Clean Edge Kit. White, blank, 500 9 1/2" by 11" (8 1/2" by 11" detached) letterhead, 200 continuous envelopes. $25.

Continuous Index Card Kit. 4" by 6", 7" by 4" overall; 500 yellow cards, 500 blue cards, 500 green cards, 500 red cards. $49.50.

Continuous Post Cards. Send as a customer notice, appointment reminder, and save on lower postal rates. Meet all postal requirements. 6" by 4" after margins removed, 500 per package. One package $14.50, five packages $58.50.

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quent notices, collection reminders, new product announcements, or order acknowledgements. Company name and address can be crash imprinted or computer imprinted in the upper left-hand corner. Computer generates message in the middle section and the recipient's name and address in the lower right-hand corner. Detach the top copy (your file or follow-up copy) and message is ready to mail. 100 per package. One package, $15. Five packages, $65.

Membership ID Cards. Blank ten-point Kromekote die-cut membership card. Form size 9" by 3 1/2", 1,000 forms per package. $79.

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Continuous Rolodex Cards. Create an indexing system with one run through computer's printer with these continuous rotary index cards. These sturdy white cards are designed for use with all Rolodex-brand files. Be sure to order correct size for your particular file. 500 per package. 4" by 2 1/6": one package, $9, five packages, $40. 5" by 3": one package, $10, five packages, $45.

Clean Edge Continuous Forms. High-quality white bond produced with perforations cut so finely that it appears to be cut when the perforated stubs are removed. 500 sheets per package. One package, $12. Five packages, $50.

Continuous Envelopes, Pocket Style. 200 continuous envelopes, $16. 1,000 continuous envelopes, $69.

Rolodex-Style Card Kit (5" by 3" detached), 500 blue, 500 red, 500 green. $39.50, individual packages $15.

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Computer Furniture, CT720 Series. Computer work center and printer stand with accessories to meet space requirements. Finished in bartonwood and dark brown vinyl laminates. Steel support rails. Work center, $169.95. Printer stand, $159.95. Corner adapter, $49.94. 45° corner adapter, $39.95.

Computer Furniture, CT710 Series. Includes computer work center and printer stand with accessories to meet space requirements. Finished in light hickory vinyl laminates. Work center, $139.95. 90° corner adapter, $49.95. Work center, $149.95. 45° corner adapter, $39.95. Printer stand, $159.95.

Paper Tractor
Goleta, CA

Paper Tractor. Carries ordinary paper through tractor feed printers. *Paper Tractor* works with all major printers and does not require hardware changes or time-consuming installation. *Paper Tractor* holds checks, invoices, letters, and legal-size paper. $11.95, plus $1.50 shipping.

PC Goodie Company
Sherman Oaks, CA

Label Kit PC Disk Organizer. End the hunt for what's on the disk. Locate files at a glance by labeling all your disks in matter of minutes. Prints alphabetized labels for floppy disks. Works with any disk in PC-DOS format, one disk drive, and any tractor feed printer. Kit includes 300 hard-to-find, 5-in pin feed labels, and complete instructions. $59.95.

PC Products, Inc.
Beverly Hills, CA

File-Ette. The perfect blend of function and furniture for your disks. A solid oak, airtight and static-proof disk box with an eighty-disk capacity that also accepts the disk cartons for files within a file. Comes with tab cards and adjustable separator panels. $39.95, $2.25 shipping.

QuickGuide. The best tutorial and reference guide for the pc used by many schools. Simple examples and programs take the user from day one to confidence on the pc. Complete command reference charts—convenient size—perfect for new user, office help, etc. Antidote to manual shock. $12.95.

PerfectData Corp.
Chatsworth, CA

Micro Maintenance Kit. Intended for periodic preventive maintenance and cleaning of flexible disk drives, tape drives, printers, CRT screens, and keyboards. $39.95.

Type Element Cleaning Kits. For printwheels and Selectric type balls. Removes paper dust and ink residue, which create problems with legibility. $19.95.

Head Cleaning Kits. For 5 1/4-in and 8-in flexible disk drives. Safely cleans single- or dual-sided drives without field engineering assistance. $29.95.

Tech Maintenance Kit. Provides the computer user with the proper materials to clean read/write heads, guides, capstans, tape paths, and other working components of magnetic peripheral devices. $24.95.

Antistatic Kit. The spray in this kit prevents static buildup around sensitive computer equipment. When applied directly to carpets, floors, furniture, and around computers, annoying and harmful electrostatic charges are minimized. $6.95.

Video Display Cleaning Kit. Recommended for cleaning terminal screens and keyboards. Contains two four-ounce bottles of video display cleaning solution, pump spray dispenser, and fifty cloths. $12.95.

Perma Power Electronics, Inc.
Chicago, IL

Perma Power Surge Suppressors. Protect computer circuitry and data programs from power line voltage surges of both types—normal mode (line-to-line) caused by power line switching and common mode (line-to-ground) caused by lightning. Available single- or multiple-outlet models. Extended life units guaranteed for three years. Prices start at $30.

Personal Computer Accessories
Redmond, WA

Antistatic Dust Cover Set. Attractive, heavy-gauge clear vinyl. One cover fits the monitor (advise type) and pc, a second cover fits the keyboard. $19.95. Printer covers (advise type/size) $10.90.

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Picture House
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Basic Comfort X7. Has a 15" by 25" work area (reading and writing) directly in front of the operator. The keyboard height is set for maximum comfort. Keyboard slides forward for protection when not in use. $189.

Precision Data Products
Grand Rapids, MI

3M Disks. Available in storage box or bulk with or without envelopes; immediate shipment. Start at $1.85 each.

Epson MX-80, MX-100 Ribbons. Premium-grade cartridge ribbons, matrix ink. Starting at $5 each.

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RKS Industries, Inc.
Scotts Valley, CA

Surge Sentry Model SS-120-M. A 120-volt unit with six receptacles. Protect entire systems, such as a computer and several peripherals, with just one unit. UL listed, five picosecond response time. 100 joules energy-dissipation rating at 100 microseconds. $104.50.

Surge Sentry Model SS-120-D. Protect equipment from voltage drops or voltage outages. When the voltage drops below a safe level, the unit shuts off; check and reset equipment before returning power. Indicator lights indicate if a dropout has occurred. Equipped with four 120-volt receptacles, five picosecond response time, 100 joules energy-dissipation rating. $132.

Surge Sentry Model SS-120-H. A 120-volt surge protector designed to protect equipment using standard three-prong, NEMA 5-15P plugs. Simply plug the *Surge Sentry* into any standard 120-volt outlet and plug the equipment you want to protect into it. UL listed, five picosecond response, 100 joules rated energy dissipation at 100 microseconds. $89.50.

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Hi-Lo Ergonomic Computer Tables. An ergonomic table counterbalanced to the computer so that there are no knobs to adjust to raise or lower the table. Just push or pull and the table adjusts easily and quickly. $375.

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Kablit. Security system guards computers and peripherals against theft. Fits most units. *Kablit* fasteners attach to equipment using existing screws; a steel cable passes through the fasteners, preventing the removal of the screws. No special tools required. $49.95.

Siechert & Wood Technical Publications
Pasadena, CA

SuperTabs. A set of sixteen Mylar-reinforced tab dividers that go in the IBM DOS and Basic manuals. Each divider has quick reference information on it that summarizes the section that follows. Available for all versions of DOS. $9.95.

SolveWare
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SongWare. Plays your choice from a list of eighteen holiday carols, including "The Hacker's Carol" (written just for IBM owners!). The current verse appears on a colorful decorated screen, with the current line highlighted for singalong fun. "Background" mode plays the first verse of each song in a repeating series. $16.95.

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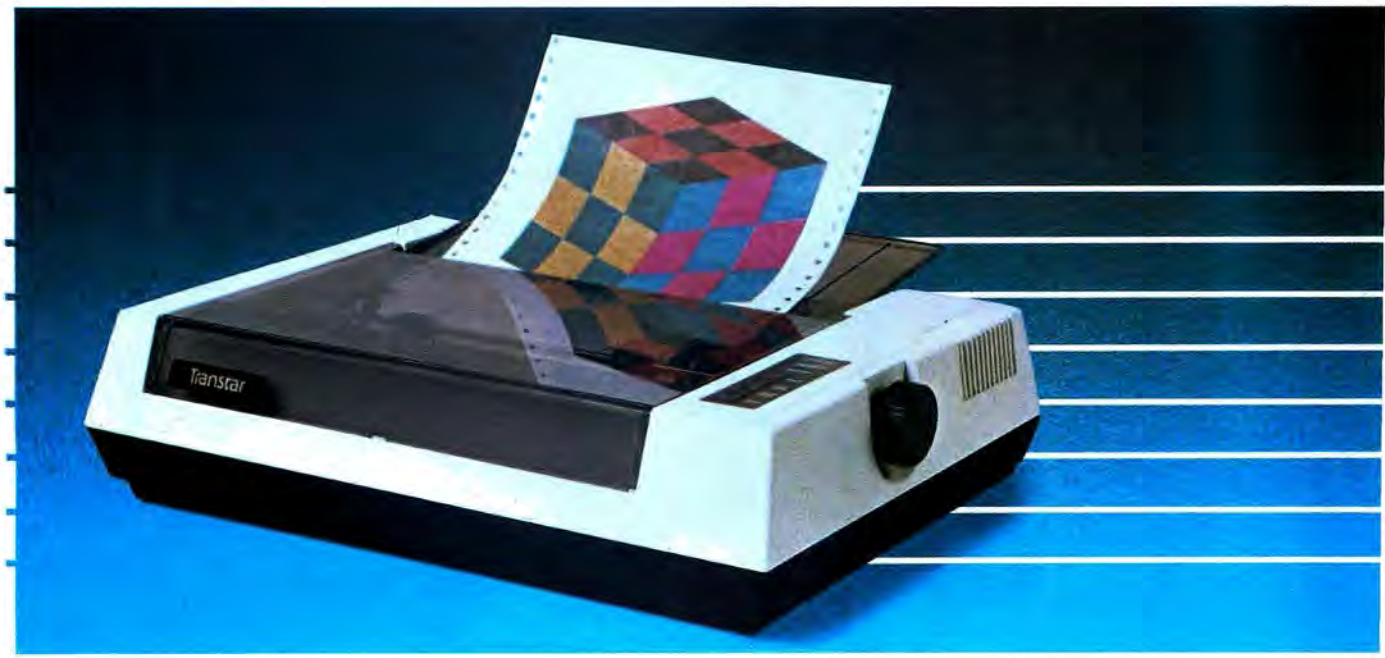

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Keyfixer. Precision-molded plastic collars fit onto existing enter, tab, backspace, and both shift keys, making them larger and easier to strike. Does not change key height and allows original keytop to show. $14.95 for set of five.

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WattsOut. An antistatic device for use with computers. When users place *WattsOut* near the equipment, attach it to a proper ground, and touch it before engaging the keyboard, static electricity, which can cause incorrect data entry, circuit damage, and memory loss, is drawn away. $9.95.

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P.C.6. Solid oak six-foot workstation combined with four accessories. The "breadboard" allows the keyboard to be positioned at comfortable typing height. The CPU hanger holds the XT or pc and frees valuable desktop work space. Storage is provided by the lower shelf and the drawer. Cord-winder pegs eliminate the tangle of cables. $990.

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VisiCalc Templates. Work with the popular *VisiCalc* program. Business management, cow-calf herd management, crop management, feed lot cattle management, machinery management, swine farrowing management, and swine finishing management. $95.

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Versacalc. An enhancement to *VisiCalc* which sorts *VisiCalc* screens, automates processing with menu-selectable modules (much more powerful than "keystroke storage"), and includes an extensive tutorial on those parts of *VisiCalc* not well documented in its own manual. Easel binder. $150.

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Business Problem Solving with the IBM PC. Includes dozens of computer programs specifically designed for use by business people in problem solving and decision making. Source codes are included in Basic, with many also in Pascal. Describes select commercial software and offers help in writing programs and in revising or customizing the programs listed in the text. Book, $19.95. Book/Disk, $49.95. Disk, $35.

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BusinessMaster
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BusinessMaster Plus. A fully integrated, menu-controlled general business accounting and bookkeeping software package including general ledger, accounts receivable with order entry, accounts payable with vouchers and purchase orders, payroll, inventory, fixed asset accounting, and mailing list. $495.

BusiSoft Corp.
Loomis, CA

BusiSoft Analyzer. A financial analysis program using ratio analysis. The program provides a large variety of ratios derived from information entered from balance sheets and income statements. Data may be entered for one to five financial periods and the industry averages. A glossary of financial terms and a tutorial on ratio interpretation. $199.50.

California Software Products, Inc.
Santa Ana, CA

Baby/34. A revolutionary software system which, for the first time, makes available to the pc user the vast library of RPGII systems and applications that have been written for the IBM System/34. Complete system includes RPGII compiler and workstation input/output, OCL, SFGR, DFU, DEU, SEU, and Sort. $2,500.

Personal computers can be somewhat intimidating. Get ProKey.

If you're like most people, you naturally assume that IBM personal computers are so advanced they practically run themselves. Plug it in and off it goes. Solving problems, making work easy, counting new profits while you drift off with headphones and Vivaldi.

Until you own one. And a fistful of software. Soon it becomes a battlefield of tedious typing, conflicting commands, picky protocols.

Grasp victory. Get ProKey.™

ProKey is a unique software program that actually operates your favorite software including WordStar, Visicalc, Lotus 1-2-3, dBase II and most others.

With ProKey you can recall frequently used phrases, headings, names, entire scripts with a single stroke. Accurately.

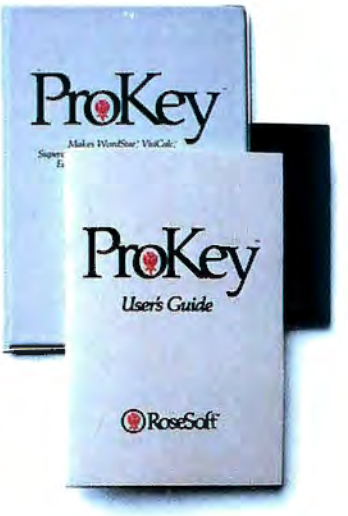
ProKey memorizes mindlessly complicated command sequences and, at the touch of a key, executes them automatically. Instantly.

Standardize a plethora of protocols with one simple personal command. Painlessly.

As you gain experience and confidence, ProKey grows with you. You'll be able to customize off-the-shelf software to your own personal or business requirements. Ultimately you'll use ProKey as a "super command center" operating your word processor, spreadsheet, database and graphics programs together to create a totally unique, incredibly productive system.

ProKey is available at most Computerland stores and wherever fine software is sold.

Once you use ProKey you'll wonder how you ever faced your IBM alone.



RoseSoft, Inc.
4710 University Way, N.E.
Suite 601,
Seattle, WA 98105
(206) 524-2350

To run ProKey, you'll need an IBM Personal Computer or workalike, DOS (any version, including 2.0), and 64K of RAM (WordStar requires 96K).

WordStar, VisiCalc, Lotus 1-2-3 and dBase II are trademarks, respectively, of Micro Pro, Visicorp, Lotus and Ashton-Tate.

A Great Software

FriendlyWare PC Introductory Set

VOTED THE 5TH MOST POPULAR IBM SOFTWARE ON THE MARKET IN SOFTALK MAGAZINE'S RECENT READER SURVEY.

MONEY magazine described the Intro Set as one of the two best learner programs available for microcomputers.

PC magazine said it "had to be seen to be appreciated".

According to SOFTALK, "the implementation and sophistication of the Introductory Set are superior to anything available in the public domain".

The Intro Set is a must for novice users, but it's a lot more than just a starter set. Even seasoned pros are finding things they like among the 4 demo programs, 17 games, and 8 utilities on the package.

Some are even saying that several individual programs on the set (such as the Personal Check Book on disk #3) are worth the price of the package all by themselves.

SUGGESTED RETAIL $49.95

FriendlyWare PC Arcade

They told us that IBM'ers wouldn't buy games; but our customer feedback told us otherwise.

When the first two PC ARCADE production runs sold out before they shipped, we knew our customers were right.

PC ARCADE is a solid lineup of 10 fast-action arcade games for the IBM PC.

ASCII MAN, EAGLE LANDER, STAR FIGHTER TX-16, SHOOTER, BRICK BREAKER, GORILLA GORILLA, ROBOT WAR, BUG BLASTER, HOPPER and PC DERBY.

All 10 were written in Assembly language for speed and Text Mode for use on monochrome OR color monitor.

All games feature a PAUSE BUTTON and BOSS IS COMING KEY, and all but one of the games (EAGLE LANDER) can be controlled with EITHER a joystick or the keyboard.

And best of all, you can play them forever on five rolls of quarters.

SUGGESTED RETAIL $49.95

FriendlyWriter (with FriendlySpeller)

Combine the best little letter writer you've ever learned to use in 10 minutes, with a fast and accurate spell checker that compares your letter with a 30,000+ word dictionary, and you've got one of the greatest things to happen to word processing since the INSERT and DELETE keys.

FriendlyWriter is designed specifically for the kind of word processing you need the most — the 1 to 6 page business or personal letter. And using FriendlyWriter is as easy as striking a key.

FriendlyWriter (with FriendlySpeller), the only word processor in the world with a 30,000+ word dictionary that sells for under $100.

SUGGESTED RETAIL UNDER $70.00.

B Great Prices

The days of the $495.00 "Watzitdo?" software package are over.

The same is true for $39.95 one game packages.

Software pricing is coming down out of the clouds, and today's software consumers are proving once again that the old American business ethic of "producing a quality product at a fair price" still has merit.

At FriendlySoft, our objective has always been to give you the products you want, in a format that you can use and appreciate, at a price you can live with.

So far, your response is telling us that we're on the right track.

C THE BEST Great Support

No other software company in the world backs their products as completely and as simply as we do.

The FRIENDLYWARE "NO FINE PRINT" LIFETIME GUARANTEE states:

"If your master diskette fails due to normal use, we will replace it, AT NO COST, within 48 hours of receipt of your original master.

If your master diskette fails due to abnormal use (staple in media, food on hub ring) we will replace the programming onto your diskette within 48 hours of receipt of your original master and a blank, unformatted, diskette.

We also offer a unique 24 hour hotline, where you get quick answers, instead of taped messages.

In short, FriendlySoft is the unchallenged leader in software product support. And we intend to stay there.

There are three good reasons why we're called "one of the fastest growing software companies in the business"

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ARLINGTON, TEXAS

Producers of innovative, quality software products
EXCLUSIVELY for the IBM Personal Computer

All FriendlySoft products are available through an international network of dealers including COMPUTERLAND STORES, IBM PRODUCT CENTERS, COMPU-SHOPS, ENTRE COMPUTER CENTERS and a growing list of independent software dealers.

BUSINESS

Carnegie Software
Redondo Beach, CA

Optalk. A program for analyzing optical systems by ray tracing. Will trace to conic surfaces with optional tenth-order axially symmetric and anamorphic deformations. A paraxial ray trace is also included. Lenses and fans can be saved on disk. $59.

Chang Laboratories, Inc.
San Jose, CA

MicroPlan. A financial planning tool with built-in formulas for loan amortizations, depreciations, internal rates of return, tax scheduling plus advanced statistical capabilities and self-programming features. $495.

Link Module. Add-on to *MicroPlan* for working with mainframe data, accounting, and data management information. Features include cross-tabulation and posting. $295.

MicroPlan for automatic consolidation of different reports, variance analysis, and control reporting. $295.

FilePlan. A data entry and management system designed like an electronic spreadsheet for easy data entry and data retrieval. Operating system: CP/M, CP/M-86, MP/M, MP/M-86, MS-DOS, PC-DOS. $295.

Charter Software
Monticello, IL

FirstBase. Database can be learned in minutes. You have complete control of the screen layout of your records and of the heading, type, and length of each line of information. $39.95.

ColorCorp
Bloomfield Hills, MI

ColorBIZ Inventory. Suitable for anyone who has inventory to manage. Easily upgrades to hard disk. Full-color user guide for quick reference. Create worksheets for setup, analysis, and valuation; provides usage and margin analysis by month and year to date. Transactions include sales, returns, orders, receipts, cancel orders, scrap, loss and physical count. $498.

Compu-Law, Inc.
Culver City, CA

The Client Management System 3.0. A comprehensive time management and billing system for small- to medium-sized law firms. Written in UCSD Pascal, the system runs on both floppy and hard disks. The program produces statements, prebills, and many reports including aged accounts receivable and aged unbilled time. $2,495.

Compumax
Menlo Park, CA

Order Entry. Handles documentation and control of both purchase orders and sales orders. It generates and prints orders and statements in mailable format. Manages changes in description, price, and quantity when orders are shipped or delivered. Computes tax and monitors back orders. $140.

Microledger. Performs the essential duties of double-entry bookkeeping. The programs will interact with other Compumax accounting programs using two files. $140.

Micropay. Handles the necessary operations of accounts payable required by most small businesses. Two files are used to monitor activity during a user-defined period and to keep a permanent record of all due and paid accounts payable. $140.

Microrec. Manages and documents the accounts receivable functions of a business accounting system. Using a transaction file, user monitors transactions and then accumulates them into a master file. Both the transaction file and the master file are easily updated at any time. $140.

Microinv. A series of programs that carry out the inventory control functions of a small business. The master file maintains detailed information on inventory stock, while the transaction file monitors data on items received into inventory or issued to job locations. $140.

Micropers. Contains two systems for the price of one: a complete payroll system and a personnel management system. The payroll system handles both hourly employees paid on a weekly basis and salaried employees paid biweekly. $140.

CompuServe
Columbus, OH

CompuServe Executive Information Service. A versatile, easy-to-use interactive video service for the executive, with software specifically designed for the pc. $139.95.

Computer Creations
Palo Alto, CA

The Ultimate. A five-in-one program combining word processor, database manager, mail merger, dictionary, and electronic mailer. Available for MS-DOS and Z-80 CP/M operating systems. $385.

Compu Trac
New Orleans, LA

Compu Trac. A consolidated program that allows the stock or commodities trader to generate studies in technical analysis and associated bar graphs to anticipate market trends. Maintains a strong support system to help with any problems. Members receive frequent progress updates. $1,100.

Computer Furniture Corporation
Chapel Hill, NC

PDMS, the Pascal Data Management System. A user-oriented data system that allows you to design and manipulate your own tables of data with storage of data retrieval, report, mailing labels, sort, statistical analysis, global replacements, and dozens of other miscellaneous functions. $199.

Computer Software Design, Inc.
Anaheim, CA

Data Ace. Allows users of any level to create powerful applications easily. It contains a full relational database management system, easy commands to selectively add, list, and modify data, and a data definition of language. Simple programming language allows access to twelve files concurrently. Catalog and full screen editor. Communications facilities. $595.

The Computer Workshop, Inc.
Houghton, MI

TCW/DMS 120. A system of easy-to-use, menu-driven programs with 120 fields per record. Adds, locates, updates, sorts, reports, plots, queries, and reorganizes information. Also includes free format report writer and file merge. Some knowledge of computer and file structure is helpful. $600.

The Fantastic Filer. An inexpensive, easy-to-use file management system for the beginning user. Capable of managing mailing lists, small accounting applications, and applications of your own design. Adds, locates, updates, sorts, shifts, and prints information. Help screens throughout. Maximum of twenty-four fields per record. $200.

Concept Group, Inc.
El Paso, TX

Architect's Business Manager. A complete financial management package for architectural firms. Fully interactive job cost system with payroll, general ledger, accounts payables, and receivables. For small- and medium-sized firms (250 employees, 134 active jobs). Compatible with AIA accounting system. $2,200 with $150 annual update fee.

Engineer's Business Manager. A complete financial management package for engineering firms. Fully interactive job cost system with payroll, general ledger, accounts payables, and receivables. For small- and medium-sized firms (250 employees, 134 active jobs). Compatible with AIA accounting system. $2,200 with $150 annual update fee.

Conceptual Instruments
Philadelphia, PA

The Desk Organizer. Provides an easy-to-use and highly integrated set of tools for making and storing notes, keeping and monitoring an appointment calendar, placing and logging phone calls, doing sophisticated calculations, and performing other functions. $250.

Consumers Software Inc.
Bellingham, WA

The Spreadsheet Auditor. Lets you print the

Introducing a graphics system to meet your every need, whether it's creating sophisticated presentations that integrate screens from your favorite programs — or expressing yourself with freeform drawings.

What Lotus™ 1-2-3 has done for spreadsheets, Executive Picture Show™ is doing for graphics.

Ordinary business graphics programs are fine as far as they go. But they are hardly the stuff of interesting business presentations.

If you need the ability to integrate and modify screens from other programs, such as Lotus 1-2-3, dBASE II®, CREATABASE, and WordStar™ — or just give free rein to your artistic side with free-form drawings — you've probably been frustated on both counts.

Now there's a business graphics system that gives you these capabilities, plus the usual line, bar, 3D bar, horizontal bar, and surface and pie charts.
It's the Executive Picture Show and it's long on capabilities where other programs fall short.

With Executive Picture Show you can create:

- free-form graphics
- business graphics
- slide show presentations
- animated presentations

Presentations to keep viewers on the edge of their seats.

Not only does Executive Picture Show accept screens from other programs, it lets you integrate them into your presentation where and when you want them. Then you can add the sound, motion, and color that insures a captive audience. Dropping in your company logo or making bar graphs take form right before your viewer's eyes is easy as pressing a few keys.

Executive Picture Show allows you to use both your IBM® monochrome and color monitors during your presentation. This means you can show a spreadsheet on your monochrome monitor, while a graph or drawing is formed on your color display.

Interactive presentations.

The Executive Picture Show was designed with you and the audience in mind. Not only does it allow you to design a moving presentation, it gives your viewers a chance to respond with more than enthusiastic reviews. They can actually input their responses so the program — and you — can act on their input.

Easy to use.

We had the business executive in mind when we designed this tool. That's why Executive Picture Show cuts through all the "computer-ese" to simplify instruction and prompts you throughout the program. We've reduced many steps to single key commands and included a handy reference card to help you get your show on the road.

Executive Picture Show is playing at a computer store near you for just $195. If you want to preview this program, contact PCsoftware of San Diego directly for a demonstration disk and documentation priced at $30.

Requires: Graphics adapter and display
128K RAM
2 disk drives or hard disk
IBM PC or IBM XT

Lotus 1-2-3, CREATABASE, and WordStar are trademarks of Lotus, PCsoftware of San Diego, and Micropro International Corp., respectively. dBASE II and IBM are registered trademarks of Ashton-Tate and International Business Machines, Inc.

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formulas behind your spreadsheets quickly and easily. Ideal for documentation and training as well as error-finding. Works with *VisiCalc*, *SuperCalc*, and *1-2-3*. $99.

Continental Software
Los Angeles, CA

Property Management. An accounting program for owners and managers of residential, industrial, and commercial properties of developments of up to 1,000 units. This program calculates and displays standard accounting reports for the overall property along with tracking individual accounting records of each tenant—such as date of payment of last rent/lease. $495.

Craftsbury Software
Washington, D.C.

Mail Manager. A professional mailing list program that creates MailMerge files for *WordStar* and other popular IBM word processors and for its own, built-in, word processor. Features 9,999-record capacity, instant search over any combination of fields, sort by name, zip or any other field, labels in up to four columns, and user-defined file structure. $89.95.

CYMA Corp.
Mesa, AZ

CYMA Accounts Payable. A cash management tool that optimizes small- or medium-sized business's use of cash. To fit the needs of different businesses, cash-basis or accrual accounting methods may be used. Any changes to data in the system that affect financial position are recorded as a complete entry in the audit files. $1,095.

CYMA Accounts Receivable. Provides small- to medium-sized businesses with up-to-the-minute accounts ledgers and aging detail on receivables. It's easy to use, functions transparently, and adheres to sound accounting principles. $1,095.

CYMA Client Accounting. System is based on the *CYMA General Ledger.* It performs job costing, budgeting, and graphing of activity within accounts. It goes beyond the *General Ledger* by performing (1) after-the-fact payroll, (2) loan amortization, and (3) ratio analysis. $1,695.

CYMA Construction. One to thirteen budget periods with the option to roll each total into a separate budget for complete tracking of income and expense accounts; complete job costing capabilities, with labor distribution and material costs posted to the appropriate project, job, or subphase within a job; automatic generation of recurring and/or reversing entries; check registers show broken check sequence and voided checks; trial balance and funds flow worksheets simplify daily data entry work; complete audit files automatically record changes that affect the financial position of the company. $2,795.

CYMA General Ledger. System stores general journal transactions and job cost entries with complete audit trails. The software provides up to twenty-six different user-defined financial statement formats, and produces a comprehensive range of financial reports for screen display or printing. $1,095.

Data*Easy Software, Data Consulting Group
Foster City, CA

Database Management. Database is the quickest way to file, sort, display, edit, and print data and labels without programming. Simply fill in the blanks and Data*Easy helps you with the rest. Data entry is limited to fourteen fields and up to 255 characters per record. $195.

Data Entry & Edit. This utility creates custom screens for data entry, delete, change, and inquiry functions. You simply call up the screen/file name in order to enter, update, or view your data. $75.

Inventory Control This system controls all aspects of the stock status, reorder point, orders, receipts, and reconciling of items. While not FIFO or LIFO accounting, it does track inventory value based on the latest cost, list, and discount prices. $95.

Mail Lists and Labels. Records can be sorted by any field. Label or directory printing can use all or only selected records. One-, two- and three-up labels are supported as well as oversize packing labels. One to ninety-nine copies of any label may be printed. "Search" allows browsing back and forth through the data file. $75.

Mail Order Control. This system is used for recording low- to medium-volume mail order sales. It keeps track of sales, tax receipts, and serial numbers. Discount sales and three tax rates are supported. $95.

Product Invoicing. This system allows you to create invoices quickly for materials billing while it keeps track of your inventory. The item file tracks quantity sold as well as the cost, list, and discount prices. Reorder point is a function of the stock status report. $195.

Purchase Order Control. This system makes ordering supplies easy and controls all of the details. Descriptions can be stored or entered on a one-time basis. On-order quantity, item reorder point, year-to-date purchases, and prime vendor are features of the inventory subsystem. $195.

Datamension Corp.
Northbrook, IL

The Manager Program Collection. Task Manager—daily time control, job expense journal. Records Manager—client and employee information file. Project Manager—critical path, resource planning system. $499.

Report Manager. A three-dimensional application generator and spreadsheet. It gives serious computer users the power of a programmable, multidimensional system for financial planning, forecasting, and statistical analysis. $399.

Datasmith, Inc.
Shawnee Mission, KS

Data Manager. A generalized file management system that allows the user to define file layouts and enter and update data at will. Features a fast assembly language sort with up to ten keys, an interactive report generator, and various utilities. $350.

Payroll System. Menu-driven payroll system features four pay categories plus salaried employees. Calculates all taxes plus user-defined deductions and allows entry of "one-time" special entries every payroll period. Prints payroll report, master list, paychecks, W-2 forms, and reports to assist in preparation of 941 forms, FUTA reports, and so on. $400.

Bookkeeping System. A simplified fixed-format general ledger system designed for users without extensive computer or accounting experience. The menu-driven system allows up to 900 accounts and features error-checking data entry, chart of accounts and journal listings, profit and loss statement, balance sheet, complete audit trail, and a check-writing feature. $300.

Data Tec Incorporated
Manchester, MO

Easy-Med. Specifically designed for medical offices. It automates billing, has a word processor, and does insurance. It is designed for the XT. $1,295.

Easy-Den. A fully integrated easy-to-use system for the dental office. It simplifies billing, comes with a word processor, does insurance, and has recall. It was designed by a dentist for the XT. $1,295.

Decision Support Software, Inc.
McLean, VA

Expert Choice. A decision support system that allows one to make comparisons among alternatives when many criteria exist. *EC* allows one to analyze a decision problem when subjection criteria and "seat-of-the-pants" judgments must be integrated with objective factors. Graphically portrayed. It is one step beyond spreadsheeting. $245.

The Business Accountant. A general ledger that does not require accounting knowledge. Instantaneous balance sheet as well as profit and loss. Backdate entries with automatic end of month balance adjustment. Define 200 accounts and sixty-three codes (to subdivide accounts). End of month reporting. Optimal interface to *1-2-3*, *VisiCalc*, or *Multiplan.* $295.

STOCKING STUFFERS

BUSINESS

Design Trends, Ltd.
Wilton, CT

SafTax. A tax preparation and simulation system that runs on the pc and XT. Data entry is simplified by using *VisiCalc* templates. Forms are printed in a format approved by the IRS for direct submittal. *SafTax* is available in three versions: 1. Individual version contains most commonly used 1040 forms. 2. Preparer's version contains all 1040 forms as well as features such as batch print and organizer, required by the professional preparer. 3. Professional version adds corporate, partnership, and trust to the preparer's version. $199, $499, and $850.

Diamond Head Software
Honolulu, HI

Stock Charting. Produces a chart of a stock's price and volume activity for the previous thirty trading days, and superimposes a thirty-day moving average curve. It reads and writes data to disk for up to twenty stocks. DOS 1.1, $49.95. DOS 2.0, $69.95.

Digital Marketing Corp.
Walnut Creek, CA

Milestone. A project management and time scheduling program which uses a "critical path" network analysis process to schedule manpower, dollars, and time. Can also produce a PERT chart in minutes. $295.

Notebook. A database management system designed especially for storing and retrieving text. Notebook can also sort and select records based on any text in any field without predefined keywords. $150.

PC/OFS. A simple yet powerful database management program which allows creation of a custom filing system. Does not require learning a technical language. $99.

Plan 80. A financial modeling system that's easy to use and powerful enough to replace most time-sharing applications. Calculation and graphic display of IRR, depreciation, ATAN and trigonometric functions are effortless. $295.

Cardfile. Stores, retrieves, and displays information that typically is kept in index card files. Each file record can contain up to twenty-one lines with the first three treated as descriptors. $89.

dilithium Press
Beaverton, OR

How to Use SuperCalc. SuperCalc is the bestselling program that prepares financial spreadsheets and forecasts. It runs on most CP/M-based systems and the IBM with MS-DOS. This book is an easy way to learn, in simple terms with down-to-earth directions, how to effectively use the spreadsheet format. Not only does the book explain what *SuperCalc* does, it tells how to organize, arrange and manipulate the data. It is also a reference manual that lists all of the program's functions and a definition and discussion of each one. $34.95.

TeloFacts I. Complete software package that shows you how to design and automate custom questionnaires, tests, polls or applications. It provides you with the capability to gather opinions, resume information, marketing data, survey data, or any other question/answer information quickly and easily. *TeloFacts* then analyzes and displays these responses in a variety of understandable methods. $49.95.

TeloFacts II. Shows you how to design and automate custom questionnaires, tests, polls or applications. Provides the capability to gather opinions, resume information, marketing data, survey data, or any other question/answer information quickly and easily. Enhanced version of *TeloFacts 1* that can be used with a card reader and ranks, lists, and scores respondents. $199.95.

Microbook: Database Management for the IBM Personal Computer. At last, here is an affordable way to have a database management system. These programs can be used for any application involving the storage and re-

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BUSINESS

trieval of information. Written in Pascal, the programs store, retrieve, and process data. Information is maintained and broken down into files. These can be accessed with keywords so the only thing necessary on your part is a rational approach to entering data. Photographs of the screen are abundant and show step-by-step the effect of each entry. $39.95.

direct.aid, Inc.
Boulder, CO

LawSearch. An intelligent terminal program for communicating with the *Westlaw* legal database. It was designed specifically for the pc and XT and has been fully tested and certified by West Publishing. *LawSearch* enables the user to download files to disk and to manipulate those files on most word processors. $350.

Distributed Planning Systems Corp.
Woodland Hills, CA

Bankreporter I. A complete budgeting, planning, and reporting system for banks, savings and loans, and other financial institutions. It is installed in more than 100 commercial banks. It includes the capability to download from an IBM mainframe. $3,750 to $6,250.

Exposure I. System to allow commercial banks to report to the FDIC and comptroller of the currency on loans to foreign countries. This is a required report for all banks with loans in excess of $20 million outstanding to foreign countries. $2,495.

Gapmanager-I. A comprehensive asset/liability system for commercial banks. Complete user definition of accounts. Interface to host computer. Installed in more than 100 commercial banks. $3,750 to $6,250.

Distributed Software Systems, Inc.
Northbrook, IL

PC-Order Entry System. Provides for the taking of an order, storing the information, printing the invoice, and producing several sales analysis reports. The system features: automatic look-up of customer, item description, and price, as well as automatic calculations of discounts and taxes. On-line maintenance available for immediate updating of prices and items. $325.

PC-Order Entry Inventory. A perpetual inventory system to be incorporated into the *PC-Order Entry System.* The system maintains the quantity of stock-on-hand items and notifies the operator when stock has reached a zero or backorder point. $50.

Dow Jones and Co., Inc.
Princeton, NJ

Dow Jones Market Analyzer. A technical analysis product that allows for automatic collection, storage and updating of historical and daily stock market quotes and construction of technical analysis charts. Access information from Dow Jones News/Retrieval. $349.

Dow Jones Market Manager. A portfolio management product that allows private and professional investors to access pricing and financial information, and provides an accounting and control system for portfolios of securities. Access information from Dow Jones News/Retrieval. $299.

Dow Jones Market Microscope. A fundamental analysis product that allows users to choose and follow indicators for extensive lists of stocks and industry groups, and to sort, rank, screen, and set critical points for buying and selling. Accesses information from Dow Jones News/Retrieval. $699.

Dynacomp, Inc.
Rochester, NY

Microcomputer Bond Program. Designed to help you evaluate bonds. It provides a quick and easy way to estimate the prices and yields of fixed income securities under a broad range of assumptions and estimates about the future. $59.95.

Microcomputer Stock Program. Designed to help you analyze stock prices. It provides timing signals for stock purchase and sales. Buy and sell indicators are generated by means of a unique auto-regressive price trend analysis. *MSP* requires only weekly high, low, and close prices and the volume of shares to aid your investment decisions. $59.95.

Tax Optimizer. A software system designed to evaluate various tax alternatives and to select the most advantageous method for the preparation of an individual Federal Income Tax. Each set of input data is referred to as a scenario. A tax scenario can contain up to five alternatives. Individual scenarios may be saved on disk for future reference. Stored scenarios may be retrieved, modified, and recalculated at will. If a printer is available, permanent copies of the tax scenarios can be printed. $59.95.

el Dorado Software, Inc.
San Francisco, CA

Bizi-Calc. The library of twenty standard financial/accounting forms for popular spreadsheet programs. Each ready-to-use form includes on-screen *Worknotes* for easy completion. Both disk and manual include a six-part spreadsheet tutorial. Manual features a comprehensive applications section for using each form for forecasting and analysis. $60.

50/50. Forty business management forms for popular spreadsheet programs. Each ready-to-use form includes on-screen *Worknotes* for easy completion. Manual includes a spreadsheet tutorial. Forms range from an advertising analysis to vehicle maintenance costs and includes breakeven, depreciation, loan amortization, profit point, compound growth, linear regression, and investment analysis. $60.

In the Mail. Business letter generator for popular word processing programs such as *Easy-Writer II* and *WordStar.* Ninety-nine professional letters covering standard business correspondence needs. Twenty-two different categories, each containing up to five variations on the theme. Categories include acceptance, collections, credit, employment, follow-up, personal, and sales. Manual features word processor tutorial. $60.

Calc-Kit. VisiCalc enhancement program for data management and presentation. Printed report designer offers variable width columns and cells plus multiple typestyles. Cell list documents your spreadsheet formulas. Interfile data mover allows information interchange between multiple *VisiCalc* files, and graphic interpreter offers nine graphic portrayals of data stored in various files. $100.

Earth Data Corp.
Richmond, VA

MicroGantt. Friendly, interactive project-scheduling software yields professional quality critical path (CP/M) network for any size project. Allows multiple task dependencies, task overlap, variable worker dedication, and fixed costs. Change any factor and the entire projection is recalculated. Change time frame to view project at different levels of detail. Loads on to fixed disks. Integrates with other products. $395. Documentation alone, $25. Dealer demo and documentation, $45.

Emerald Software
Seattle, WA

The Small Fortune Auto-Ledger. A simple, powerful, general ledger package for small businesses. Supports single-entry or self-balancing double-entry transactions, up to 400 general ledger accounts and eight departments. The audit module features search and display capability by date, account, or description. The reports module can even generate accounts receivable and accounts payable reports, invoices. $250.

Ensign Software
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Church Membership. This full-featured database is designed to maintain any church's membership records and financial pledges. You can add families, update, retrieve, and browse through records. Print membership list, address labels, telephone directory, class rosters, and more. 80-column. $99.95.

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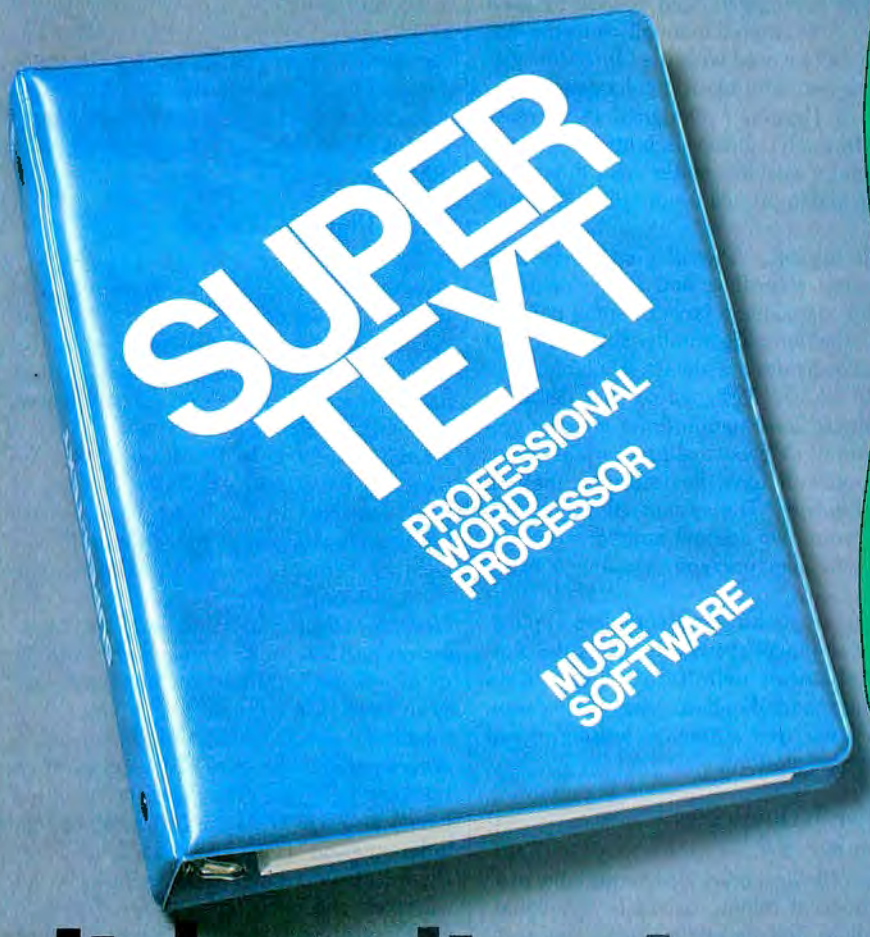

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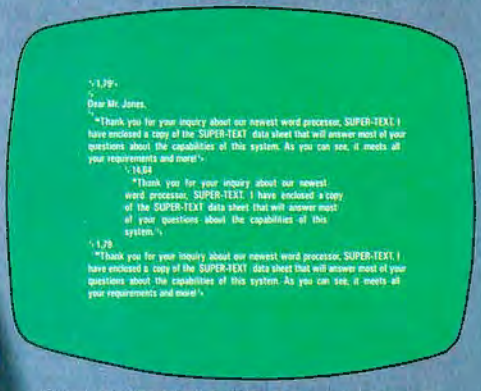

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The Financial Analysis Package. Performs analysis for financial executives in determining whether to lease or buy; figuring loan and lease payment schedules; analyzing capital budgeting alternatives, and determining depreciation schedules based on the Economic Recovery Tax Act of 1981. $92.95.

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Encore! Comprehensive corporate planning, analysis, reporting, graphics, and modeling system combining spreadsheet features with an English-based financial planning language with many features and capabilities built-in. An upgrade of a 5,000-user system. $1,850.

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Flexware. A mature and complete application-development system that provides simple application definition using a data dictionary and database, easy application modification, and automatic writing of end user documentation.

Frontier Technologies
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Medpac. Medical office system package provides medical billing, accounts receivable, scheduling, and patient records. This software is designed using a general-purpose relational database. $2,495.

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GAI Systems
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CHRIS—Complete Human Resource Planning and Information System. A human resource software package designed for personnel people. Functions include general administration, compensation, attendance control, EEO, job history, training/development, human resource planning, career planning, organization planning and forecasting, and modeling. Chris 1.0, $400. Chris 2.0, $1200.

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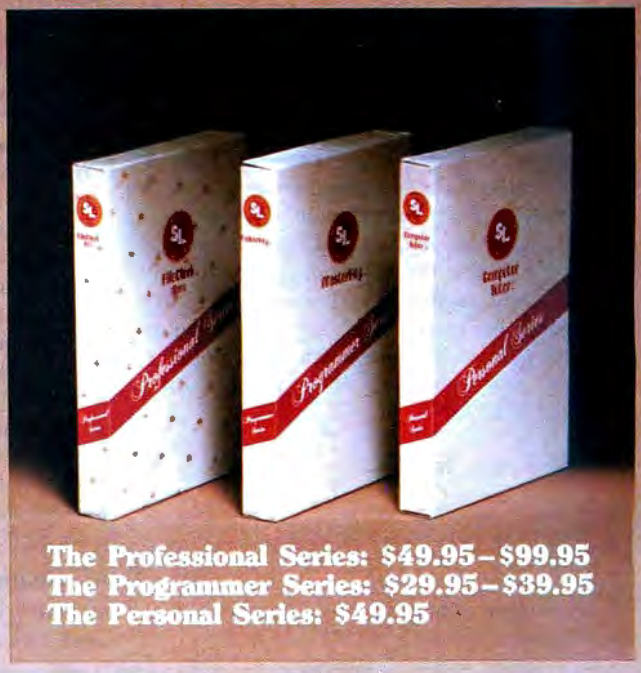

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PC Statistician. Offers general statistics questionnaire analysis and a research database. Each analysis lets you choose any part of your data file for analysis. Features include a one- and five-way cross tabulation, analysis of variance, regression, and nonparametrics. $300.

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Checkbase. Easy-to-use personal accounting tool that efficiently organizes up to ninety checking accounts, simple ledgers, and credit accounts. Automatically reconciles bank statements and lists checks by numerous methods. Choose up to sixty tax/cost categories to speed up year-end tax preparation. Key in information once to generate checks and complete the check register. $95.

Investment Manager. Reports and measures investment performance of individual securities, security groups, and entire portfolio. Reports include: inventory, transaction, security performance, portfolio performance, and tax. Communicates with numerous financial databases as well as interfacing with Lotus *1-2-3*, *Multiplan*, and *VisiCalc*. Menu driven for both the professional and novice.

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Info-Gen. Record management system providing quick and easy filing and retrieval of information. Assists the computer in defining a complete application including date files, screens, and reports. $245.

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Pharmacy Blue. Retail pharmacy system maintains customer files and drug inventory for prescription processing and billing. Contains a multitude of reports, including insurance analyses, drugs on order, alphabetical listings of customers, drugs and doctors, and receivables analysis. Supports nursing home activity. Menu driven and function-key oriented. Documentation included. $5,500.

Amsched. Comprehensive mortgage amortization program that prepares amortization tables from input. Provides monthly and yearly breakdowns of principal and interest as well as paid-to-date-figures. Prints out on 8 1/2" x 11" continuous-form paper. $30.

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Alert. A legal calendar and docket control system that manages attorney schedules and critical dates or events. The package maintains schedules for all attorneys in a firm and produces a daily activity calendar for each, as well as a firm schedule for any selected period. Critical events such as statutes of limitations, court dates, hearings, and filing deadlines are easily managed by the system and automatic remainders may be optionally printed for any event. *Alert* greatly reduces the possibility of missed filing dates, appointments or court appearances, and schedule conflicts, and additionally, may reduce a firm's malpractice insurance rates. $500.

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Printer X Switch. Permits businesses with two computers and two parallel printers (dot-matrix and daisy wheel) to direct either computer's output to either printer for word processing or graphics. Includes printer cables. $220.

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Intra Day Analyst for Commodities. Provides real-time graphics and technical analysis for futures price action. Tracks twenty commodities. Each has a variable-length bar chart and one of fourteen technical studies on-screen simultaneously. A strong support system is maintained for user problems. Members receive regular updates. $1,500.

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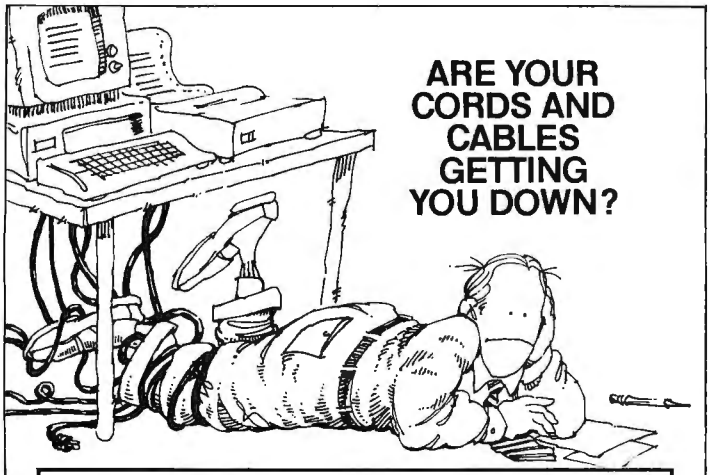

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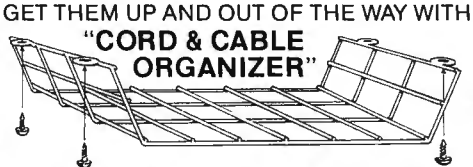

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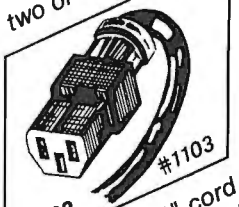

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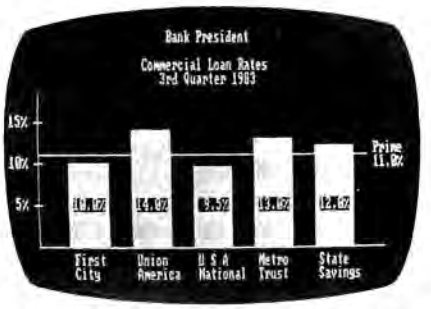

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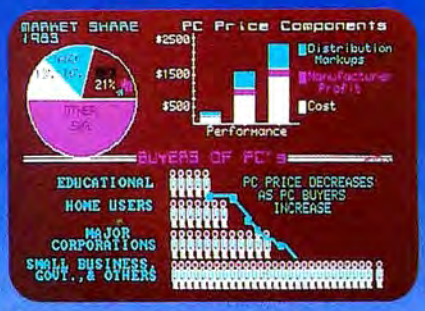

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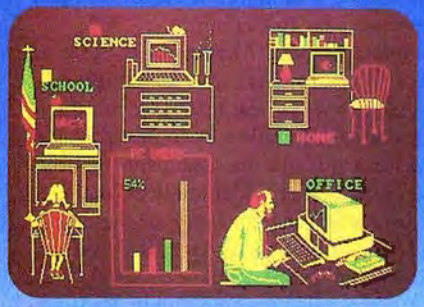

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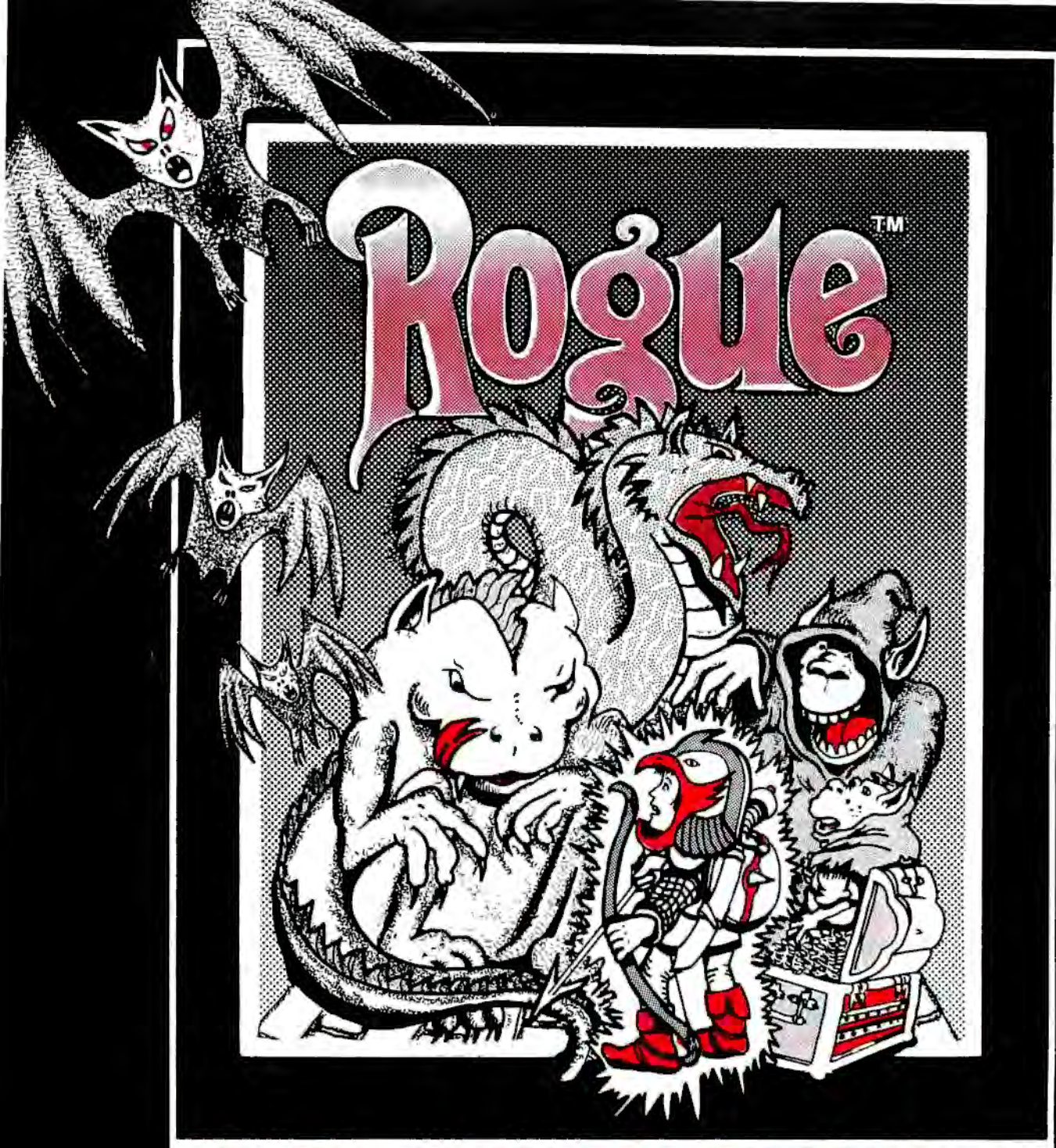

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The Savant Investor Series. A set of integrated programs that help you plan, follow, and analyze your investments. Includes technical charting, fundamental analysis, and portfolio. Requires two disk drives, color/graphics card, 128K. $995.

The Technical Investor. Has four independent windows that can plot prices, volumes, point and figure charts, relative strength, and more. Copy charts on printer. Update prices automatically by modem; up to ten years of data on stocks and market indices available. Requires color/graphics card, two disk drives, 128K. $395.

The Fundamental Investor. Fundamental analysis, database, and communications programs. Store up to one hundred items on up to 1,700 securities. Enter data by modem. Screen, sort, calculate financial ratios. Retrieve data from Dow Jones automatically, other services manually using the terminal program included. Requires two disk drives. 128K. $495.

Sensor-based Systems
Charfield, MN

Metafile. An information management system for the pc, XT, and other 8088/86-based systems. Creates a development and operational environment that provides integrated facilities for high-level programming, word processing, database management, modeling, report generation, communications, forms generation, menu building, and data conversion. $995.

Silver Soft
Wichita, KS

SilverSoft. A set of management software applications for personal computers: SilverBudget—double entry budgeting and accounting; SilverCalendar—financial calculations; SilverFolio—personal worth and inventory plus financial calculations; SilverWriter—word processing and mail list management. Available for CP/M, CP/M-86, and PC-DOS operating systems. $399.

Simple Soft, Inc.
Elk Grove, IL

The QuikCalc Loan Analyzer. Provides detailed analyses of loan and mortgage instruments. Includes complete annual and monthly amortization schedules, with optional balloon payments. Also performs special calculations such as early loan terminations, summary of loan proceeds, effective interest rates, and payment between dates. $99.95.

The QuickCalc Real Estate Investor. Analyzes both individual residence and income properties. Both models address a number of particular real estate market problems, including financing structures, expense schedules, cash flows, tax benefits, and internal rate of return. $129.95.

SimSoft, Inc.
Port Huron, MI

The Payment Scheduler. Prints amortization schedules according to the desired payment. The user inputs the amount of the payment that is wanted along with the interest rate, principal amount, and date of first payment. *Payment Scheduler* then prepares a concise easy to read amortization schedule. $40.

Smith Micro Software
Sunset Beach, CA

Stock Portfolio System. 2nd edition. An investment portfolio accounting, record-keeping, and timing control system. Investments covered include stocks, bonds, options, money markets, certificate of deposit, and other cash accounts. Security values entered either manually or via modem. Terminal mode provided for access to Dow Jones. $185.

Softrend, A Division of Information Solutions, Inc.
Charlottesville, VA

The Fixed Asset Manager. Provides a complete depreciation and asset cataloguing tool for business and personal users. The system incorporates many unique features enabling flexible reporting and asset evaluation. $150.

The Time Scheduler. A comprehensive time management system for both the personal and professional user. May be used for appointment scheduling, project management, maintenance schedules, legal deadlines, investment reminders, and more. $99.

Magazine/Book Reference. An abstracting program that allows the user to quickly record and retrieve references to any type of information in magazines, books, proceedings, journals, and so on.

Softstar, Inc.
Juno Beach, FL

VisiCalc Real Estate Templates. Amortizations, personal financial statements, ACRS depreciation, income property investment analysis, internal rate of return, mortgage loan analysis. A versatile problem-solving package for executives, developers, brokers, accountants, attorneys, and real estate analysts. Combines the power and flexibility of *VisiCalc* with the simplicity of a menu-driven program. $129.

Peachtree Connection. Can unite IBM's Peachtree *General Ledger* to a variety of spreadsheet programs (*VisiCalc, Multiplan, 1-2-3*). Allows the user to do forecasting, budgeting, and modeling with up to five years of accounting data. Preformatted worksheets can be created from direct access, without having to rekey all the data into spreadsheet program. DOS 1.1, $129. DOS 2.0, $149.

Business Planning Tool. Creates budgets and detailed business plans in minutes at the keyboard. Prints reports or automatically creates preformatted worksheets or templates for *VisiCalc, Multiplan,* or *1-2-3.* $195.

Software Arts
Wellesley, MA

TK!Solver. The first-ever equation processor for personal computers, is a revolutionary tool for anyone who uses equations, formulas, and modeling for analysis, design, planning, or problem solving. Features a unique backsolving ability, iterative and list solving, tables and graphs, automatic unit conversion, and thirty-four built-in functions. $299.

TK!Solver Pack for Mechanical Engineering. Designed for use with the *TK!Solver* program, includes thirteen models each complete with the equations and values necessary to solve problems common to mechanical engineers. Topics include analysis of elastic beam bending, springs, area moment of inertia, Mohr's circle, rotational systems, heat transfer, fluid flow, and hydraulics. $100.

TK!Solver Pack for Financial Management. Designed for use with *TK!Solver,* includes thirteen models each complete with the equations, values, and tables necessary to solve problems common to financial analysts and managers. Topics include compound interest, net present value, level debt service, cost of equity, capital analysis of financial statements, stock option pricing, bond swaps, convertible debts, and bond-refunding decisions. $100.

Software Connections, Inc.
Santa Clara, CA

LAN:DataStore. Multiuser database man-

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agement package with screen-oriented forms creation/forms retrieval program. Specifically designed to provide: (1) concurrent access protection for multicomputer local area networks, (2) data access security for different levels of users, and (3) large data capacity (16M/database). $645 to $1,945.

Software Publishing Corp.
Mountain View, CA

PFS:File. Allows the user to record, file, retrieve, and summarize information. $140.

PFS:Report. Sorts, calculates, formats, and prints presentation-quality reports from information in files created with *PFS:File*. Totals, subtotals, averages, subaverages, counts, and subcounts can be printed on every column. $125.

PFS Solutions. Ready-made applications of PFS software for specific record-keeping tasks. With each *PFS Solutions*, you get a complete form design and predefined reports that are used with *PFS:File* and *PFS:Report*. Twelve disks with guides, $20 each.

Software Solutions, Inc.
Milford, CT

DOSease. User-friendly interface applies a menu-driven selection process to command execution, bringing enhanced usability to the full power of DOS. Easy access to all system capabilities. $60.

Medease. Comprehensive office administration program to serve a medical practice. Requires no knowledge of programming. Automates the processing of all patient and practice information from billing and insurance claims to reporting clinical information. $995.

Wordease. Full-function word processor, part of the *Dataease* integrated system. Stands alone or interfaces with other applications. Features a comprehensive set of editing options, menus, and function keys. Supports a variety of printers. $295.

Dataease. Relational database management system uses menus and function keys. Builds application quickly and simply without programming. Easy form definition, data entry, plus flexible reporting and record updating capability. $595.

Software Technology for Computers, Inc.
Newton, MA

IFO. Employs the use of CAPASS (Cross Tabbing Routine) algorithm and Soundex intelligence to find phonetically information that you can't spell or pronounce. Features global editing, calculated fields, screen building routines, duplicate options, five-level cross tab search capability, quick-formatted prints, report generator and sort files. $125.

The Mailing List. Maintains a complete mailing list and generates a telephone listing (sorted by last name). The telephone listing includes last name (company name), first name, phone number, and record number. *The Mailing List* database can be added to, changed (on-screen), deleted, sorted, searched, and reformatted. Accommodates nine-digit Zip Codes for use outside the U.S.A. Up to 1,500 labels can be stored on a single disk. $75.

Solutions, Inc.
Montpelier, VT

VIS/BRIDGE/DJ. Transmits data from Dow Jones News/Retrieval directly into a *VisiCalc* spreadsheet. $295.

Source Telecomputing Corp.
McLean, VA

The Source. An on-line information and communication service for personal computer owners. Provides electronic mail, bulletin board, conferencing, UPI news, stock and bond quotes, financial news, electronic shopping, airline schedules, movie reviews, hotel and restaurant guides. Membership,

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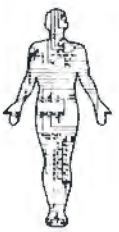

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Spectrum Software
Sunnyvale, CA

Accounts Receivable. An invoicing and receivables management system. Provides on-screen invoice data-entry form for creating detailed invoices and a journal for manually recording invoices, payments, and credits. $150.

General Ledger. A double-entry bookkeeping system. Provides an on-screen transaction journal, allowing 500 transactions per month. The system provides 500 user-defined accounts spread over sixteen balance-sheet categories. $150.

Math Series. A menu-driven series of programs including numerical analysis, statistical analysis matrix, and three-dimensional surface plotter. Employs hi-res graphics and hard copy for presentation of results. $50.

SSR Corporation
Rochester, NY

Infotory. A standalone inventory management system that can accommodate 5,000 to 50,000 inventory items depending on the system configuration. *Anyreport* is a data management subsystem built into *Infotory* that allows the user to customize reports based on the thirty-six predefined fields of information provided for each inventory item. Floppy, $425. Hard, $575.

Omnifile. Menu-driven and easy to use, like simple file managers, but is flexible and powerful enough to be truly useful in a business and professional environment, without requiring any programming. $425.

Star Software Systems
Torrance, CA

The Accounting Partner. A low-cost accounting system that includes a general ledger, accounts receivable, invoicing, accounts payable, purchase orders, and payroll. For the pc or XT. $395.

Starside Engineering
Rochester, NY

ANOVA/Plus. An analysis of variance utility—a statistical tool for comparing the variances of two or more populations. Analyzes up to five factors. Data file create/edit capability included, as is Scheffe's test of individual mean levels. In machine code and very fast. $69.95.

State of the Art, Inc.
Costa Mesa, CA

Billing System. Can turn the records of time invested and expenses incurred into detailed bills to your clients, including charges and expenses exactly as you want your client billed. Also tracks client billings and processes receipts. Other aspects are a detailed aged-open bill report and month-end summary. Allows for multiple levels of employees and billable employee rates storing individual employee records that may be analyzed. $395 to $595.

Budget & Financial Reporting. Expands general ledger record-keeping to include budget and history information. Provides for divisional, departmental, budgetary, and comparative reporting along with automatic posting of recurring journal entries and produces an automatic audit trail of all activity to date. $395 to $595.

Inventory Control. Combines sophisticated database management and reporting capabilities. Allows for minimum/maximum quantity, economic order quantities, and maintains purchase order and on-hand data. Multiple costing methods are available concurrently including average, last receipt (LIFO), and original cost (FIFO). The automatic generating of count sheets with location and costing information also are provided. $395 to $595.

Sales Invoicing. Invoice entry is made faster by accessing address and terms information from the customer file. Billing instructions and pricing data may be retrieved instantly from stored information. Comprehensive sales journal reporting includes daily invoice recaps, gross profit analysis, sales commission reporting, and monthly profitability reporting by invoice, salesperson, and customer. $395 to $595.

Statistical Computing Consultants
Burke, VA

Survtab. Survey analysis software. Tabulates data from survey questionnaires. $180.

Stone and Associates
La Jolla, CA

CataList. Prepares fully compatible, interface disks for any of the thirteen most popular word processors. Allows users to merge addresses with customized form letters created by the user's word processing system. $195.

Sunward Systems, Inc.
Chicago, IL

Fulfillment I. A subscription fulfillment, accounting and list maintenance program which is also adaptable to mail continuity programs, single-product mail sales, and fund raising. $75.

Sunmail. A completely menu-driven mailing list maintenance program with fields for name and business address, address, and nine-digit Zip Code, two dates, two telephone numbers with area code, and foreign address. Unlimited number of codes available for each record. Output by mailing labels, directories, document labels, and form letters. All output can be selected on the basis of Zip Codes, dates, and selection codes with any information printed or suppressed. Output is in Zip Code or alphabetical order. $99.

Superex International Marketing
Yonkers, NY

Superex Retailer. Issues sales receipts and invoices, updates inventory (2,000 items on floppy, 20,000 on hard disk), tracks backorders and receivables, creates receiving reports, maintains a customer mailing list, tracks sales by item and salesperson and contains a powerful report generator. $300.

SuperSoft, Inc.
Champaign, IL

VoiceDrive. A complete software interface that stands between the voice recognition hardware and application software. Available for use with *ScratchPad*, SuperSoft's spreadsheet program. Allows the user to enter and manipulate data on the screen by voice command. Keyboard and speech commands are interchangeable. Requires 128K and Tecmar Voice Recognition Board. *ScratchPad* with *VoiceDrive*, $495. With Tecmar board also included, $995.

ScratchPad. Spreadsheet program featuring virtual memory, which allows disk space to be used as backup for RAM. *ScratchPad*'s rows and columns are flexible to 999 in either direction. Window splitting is unlimited. Consolidation and merge functions are included, allowing similar spreadsheets to be merged and added or averaged together. $295.

Personal Data Base. An easy to use database program that allows the user to keep track of various business and personal information. The user controls the length and time of records in file, number of characters per field (maximum fifty), and number of fields per record (maximum twenty). Records can be added to established files, deleted, or updated. Report columns can be added or averaged. Menus and screen prompts are designed with ease of use in mind. Requires IBM or Epson printer. $125.

Sydney Development Corp.
Vancouver, British Columbia

Real Estate Analysis System. A complete package of interrelated modules designed to help professionals and investors address a mix of applications. All modules may be purchased separately. Modules include Contemporary Loan Plans, $155; Mortgage Portfolio Management, $135; Development Pro Forma, $350; Development Quick Analysis, $400; Property Cash Flow and Yield Analysis, $500; and Property Income and Expense Analysis, $500.

Real Estate Office System. A comprehensive

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tool designed to streamline the commercial and residential real estate offices. Designed with the first-user in mind, the system consists of four separate but fully integrated modules: Sales Management, $850; Listings Management, $650; General Accounting, $600; and Word Processing, $400.

Stox/M. A portfolio-management system designed for the individual or small investment group. It allows you to keep track of portfolios of securities. These may be stocks, bonds, options, or whatever securities you choose to invest your money in. $225.

Stox/C. A technical-analysis program designed for private investors, brokers, professional technical analysts, and financial analysts. Up to sixteen securities can be tracked on a daily basis for over one year. Outputs include price charts, relative strength indexes, moving averages, differences between moving averages, filter and trends, on-volume volumes, and momentums. $175.

SysteMathica
Pittsburgh, PA

PC-MILP. A general purpose, large-scale linear programming package. With state-of-the-art compact database generator for sparse matrices and structured problems. Mixed integer, all integer branch and bound capability, and 8087 math coprocessor options available. $495.

Systems Design Lab
Redondo Beach, CA

Pro Football (NFL) The Gold Edition. Pro football prediction system designed for the serious handicapper. The program has produced excellent results against Las Vegas line and comes complete with a system disk, data disk, and more than one hundred pages of documentation. $199.50.

Systems Plus, Inc.
Palo Alto, CA

The Landlord. Handles all the paperwork and record-keeping functions for any type of income rental property. Can maintain multiple owners and multiple rental units and types. Prints a variety of financial and management reports, checks, and mailing labels. $595.

Books! The Electric Ledger. Appears on-screen as a typical ledger page. Recurring entries and enhanced budgeting modules. $345.

Client Manager. A CPA writeup package. Users have flexibility in setup and numbering of accounts and journals. Time and billing available. Requires hard disk. $1,400.

Medical Manager. Front office financial and clinical medical management software. Has a built-in report generator that allows unbinded formatting of insurance forms and client bills. From $4,000.

Tarrtec Enterprises
Commack, NY

Name Directory. Database program capable of storing 2,000 records on a single disk. Provides mailing labels, record lists according to user-define catalog codes; geographically by area codes, states, Zip Codes, or partial Zip Codes. $33.

Tax Man, Inc.
Huntsville, AL

Taxman-84. With *VisiCalc/SuperCalc*, prepares form 1040. This template series includes all forms and schedules in IRS-approved printable format. The logic provided will identify deductions that exceed statistical standards, compare this year's data and tax results with last year's, and flag forms which change because of last-minute changes in your input. $95.

Taxcalc, Inc.
Fort Worth, TX

Taxcalc. A tax-planning template to be used in conjunction with *VisiCalc*, *SuperCalc*, *1-2-3*, or *Multiplan*. Allows the computation of income tax variables and selects the lowest

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Blaise Computing's productivity tools allow Pascal and C programmers to develop reliable software taking full advantage of the capabilities of the IBM PC and XT. Support for Microsoft and IBM Pascal, and Microsoft (Lattice) C is provided. Because all routines are carefully constructed in the language for which they were designed, the tools provide an excellent model. Pascal procedure support is implemented as separately compiled units, and the C functions are delivered as part of a function library. Now you can write your applications rapidly in the two most powerful languages available for the IBM PC. All packages come with a comprehensive Reference Manual, extensive examples and sample programs.

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Total string capability, complete screen access, keyboard handling a graphics interface, access to all BIOS functions, and much more are provided in over 40 routines. All routines are carefully crafted and documented to give you the information and flexibility you need. A general Macro Assembler BIOS gate allows you to access any BIOS function from Pascal or C, and demonstrates how to interface assembly language routines. Everyone using Pascal or C should have TOOLS. User Manual only. $30.

TOOLS 2 — All Source Code is included

The power of DOS 2.0 is supported using high level Pascal procedures or C functions. Program chaining, DOS internal and external command execution, use of all available memory, extended file handling, and other utilities are some of the features provided. A general DOS gate allows you to access any DOS function from Pascal or C. User Manual only. $30.

VIEW MANAGER — Source Code available

VIEW MANAGER is a screen support system of a mainframe for the IBM Personal Computer. VIEW MANAGER is a menu driven, screen oriented system allowing you to develop user oriented screen interfaces. Screens are constructed with a true Screen Painter supporting any attribute or color, and the screens are stored efficiently in a Screen Database. Database utilities allow you to copy screens to stand-alone databases and to archive screens. VIEW/LIBRARY supports access to screens and true block mode data capture and display from application programs. Available soon will be VIEW/LIBRARY for Microsoft (Lattice) C. The source to the procedure library is available for an additional $150.00. Demonstration diskette and User Manual $35.

VIEW MANAGER, TOOLS and TOOLS 2 run on the IBM Personal Computer and XT. TOOLS 2 requires DOS 2.0; TOOLS and VIEW MANAGER can be used with any version of DOS. Specify if you wish Pascal (Microsoft and IBM) or Microsoft (Lattice) C versions. Blaise Computing can also provide you with the Microsoft Pascal and C compilers with qualified support. Call or write for details.

TOOLS	125.00
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VIEW MANAGER (with Library Source)	425.00
MS-Pascal Compiler	325.00
Microsoft C Compiler	450.00

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TCI Software
Flourtown, PA

Mailtrak. Stores up to 2,400 names on a floppy disk, generates telephone directories, labels (up to four across) with up to nine lines, master list, and files for *WordStar* or *EasyWriter* in reports. Instant locator finds information by last name, company, street address, city, state, or Zip Code within seconds. Manual, $15. Disk and manual, $65.

TCS Software, Inc.
Houston, TX

Client Ledger System. A multicompany general ledger system designed specifically for public accounting firms and others who provide accounting services for small businesses. Highlights include the accelerated cost recovery depreciation schedule, a fully integrated passive payroll, ledger consolidation, 941 worksheets, W-2s, 1099s, and the generation of more than fifty reports. Price to the end user is determined by deal installation, training, and support.

QLabel. Generates labels from information stored in *Total Accounting System* data files. The label format is completely user defined, allowing the flexibility to create labels in the exact format required. Can also be used to prepare "labels" on media other than standard labels. Price to the end user is determined by dealer installation, training, and support.

QWord. A word processing package that offers advanced editing and printing features such as four-function integer math, true proportional printing, and full use of function keys. *QWord* interfaces with the *Total Accounting System* data files. This interface allows customized mailings, letters, reports, and other documents. Price to the end user is determined by dealer installation, training, and support.

Simple. A database management system that uses *Total Accounting System* data files to their fullest advantage. The user can generate customized reports; query, display, enter or delete data from both *Total Accounting System* data files, and separate files created in *Simple*. Special features include customized reports and queries, English-sentence commands, subtotals and totals of fields or report columns, and cross-referencing and multiple-sort indexing. Price to the end user is determined by dealer installation, training, and support.

Tecmar, Inc.
Solon, OH

Elan. Office communications systems provides the link between people, machine, and telephones. Performs the conversion of voice signals to data signals, and back again. The ability to digitize speech, then reconstruct speech from stored data is central to many of the voice, mail, message, and telephone-related functions of *Elan*. $1,695.

TexaSoft
Dallas, TX

CALL (Computer Assisted Learning Language). Aimed at the educational and industrial training market. Features an authoring system (Create) which allows instructors with little computer knowledge to create tutorials, electronic "training manuals," and computer monitored texts. The CALL language takes advantage of many of the features of the pc such as the use of sound, color, and character graphics. Also contains an extensive editor, a grading program, and other useful utility programs. $450.

Electronic File Cabinet. Creates a "file folder" in which you can place information on the "tab" (keywords) and then store up to 200 lines of free formatted text "inside" the folder. PC File will store as many "file folders" (records) as your disk space will allow and will retrieve these records by number, keyword, or multiple keyword (Boolean) searches. $75.

The TexaSoft Combo Pac. An integrated system of business programs. Separately, these three programs will meet a wide variety of business needs. However, the interrelationship among the three programs make each even more powerful. Each of the three programs creates standard ASCII files. These files can then be used by the other programs. Tables created in *The Thinker* can be saved in a file on disk. *PC File* provides a method of storing textual information along with associated keywords for easy storage and retrieval. Records of textual information entered into *PC File* can be output to an ASCII file. *VersaText* can then be used to edit this file or include it into word processing documents. Users with hard disks can place all three programs on the same disk for increased integration. $325.

Time Accountant
Palo Alto, CA

Time Accountant. A flexible timekeeping and billing tool. Tracks up to two dozen professionals, maintains existing codes, adjusts rates or charges, bills at any time, and uses your own forms. Requires 128K RAM, DOS 1.1., two 320K disk drives, hi-res monitor, and printer. $320.

T/Maker Company
Mountain View, CA

T/Maker III. An integrated program offering word processing, spreadsheet, data management, file management, and graphics functions. Every command and function is directly accessible and works on every file. It has a complete word processor with header and footer capability and automatic footnote placement. A word processing-based spreadsheet reduces spreadsheet setup time and complexity. The data management functions perform sorting, tallying, including and excluding tasks. $275.

Universal Data Products
Buffalo, NY

UDRI Data Base Manager System. A menu-driven package of programs designed to allow the operator the ability to create files, add, change, and delete information at any time; organize the file in a variety of ways; and print a multitude of reports and labels. $199.

User-Friendly Software, Inc.
Melville, NY

The Apartment House Manager. A complete system designed for managers of apartment buildings. The manager can determine the status of apartments, keep a general journal of all income and expenses, and review a monthly profit and loss statement. $395.

Walonick Associates, Inc.
Minneapolis, MN

StatPac. A complete data manager and statistical analysis package with features similar to mainframe SPSS. Includes batch processing, data transformation procedures, and a complete range of statistical procedures. Handles 5,000 cases with up to 255 columns of information per case. Not recommended for the novice researcher. $400.

Waterloo Microsystems, Inc.
Waterloo, Ontario

Waterloo Port. A standalone or local area network operating system with the following features: multiple processes; interprocess message passing; user-interface support for multiple windows, pointing and selecting, menus and icons, mouse, tablet or trackball. Local area networking; network services; tree-structured file system; browser for the file system and networks; full-screen mouse-oriented editor; commands, pipes and filters; mainframe communications; real-time; portability; several language processors; integrated software development tools.

Weiss Associates, Inc.
Red Bank, NJ

Venture. Performs business planning, strategic planning, and capital investment analysis. Contains the logic, accounting procedures, calculations, and reports. You specify your parameters and enter data; no need to write equations or design reports. $495.

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John Wiley & Sons, Inc.
New York, NY

Buy or Lease: A Financial Decision Maker. A practical program to help business owners and purchasing agents weigh all the costs, direct and indirect, of buying or leasing capital equipment—from typewriters to trucks to machine tools. Incorporates all provisions of the 1982 and 1983 tax acts to show most profitable decision. $125.

Woolf Software
Canoga Park, CA

Money Manager. A personal and very small business finance program for systems using CP/M or compatible operating systems. Full facilities are provided for manipulation, reporting, and graphing expenditures and budgets. The systems support any number of user-definable accounts. An on-line help facility is also provided.

XQ Software, Inc.
Norcross, GA

The Investment Strategist. Determines whether a particular tax shelter is a good investment. Lets a financial planner compare the tax shelter's rate of return with projected returns of other types of investments. Can also compare several tax shelters with each other. $395.

The Tax Strategist. Automatically determines the right amount of tax shelter based on an individual's financial situation. The program turns the pc into a sophisticated tax planning tool that helps an investor evaluate strategies for reducing tax liability. $395.

COMMUNICATIONS

Advanced Micro Techniques
Foster City, CA

MicroEZLNK. An interface to Western Union's EasyLink service. Provides automatic dialing, automatic message formatting, and automatic log-on to the EasyLink system with a single keystroke. Through the use of the directory services function, the user is able to send a single message to multiple recipients with a single connection. Takes care of formatting the message for the various types of messages available, including telex, TWX, Mailgram, telegram, and international cable, all automatically from the same message file. $150.

Intelligent Terminal. Allows the user to connect to other computer systems or communications utilities such as the Source or CompuServe. With *Iterm*, you may record all received data into a disk file. You may also transmit data previously recorded in a disk file. While on-line you may display disk directories, erase files, alter the communications parameters, and open and close the receive and transmit files. $150.

MicroTLX. Turns your CP/M computer into an intelligent telex/TWX machine. You can send and receive telex and TWX messages from anywhere in the world. You may also send mailgram, telegram, cables, and multiaddress messages to any location. MicroTLX provides all these facilities through a simple-to-use, menu-driven interface. MicroTLX connects to the Telex II (TWX) network. $150.

Advanced Systems Concepts, Inc.
Pasadena, CA

ALD8, AQS 11. Expanding line of data communication equipment. Cable, modems, intelligent and manual data switches, and converters available. Products allow peripheral networks using RS-232C or parallel interfaces in a business environment. Staff available for configuring peripheral networks using RS-232C or parallel interfaces in a business environment. Cable, $4. Modems, $110. Switches, $60-$200 per port. Converts, $100-$500.

PC Switch. Port expander, sharings for computers and modems using RS-232 or parallel ports. Allows remote operation of peripherals and computers under software control of electronic switches. Staff available for configuring peripheral networks. Twenty-four hour ASCII Express service available. $50 to $200 per port.

AgriData Resources, Inc.
Milwaukee, WI

Agri-Star. Connects your computer or data terminal to a world of agricultural news, weather, and commodity prices from Merrill Lynch, Associated Press, USDA, and more. A must for anyone involved in any phase of agriculture. For more information: 800-558-9044. Basic user fee $199.

Alpha Software Corp.
Burlington, MA

The Apple-IBM Connection. Allows for the communication between two computers—the IBM pc-XT and the Apple II+, Apple IIe, and the Apple II. It not only allows the easy transfer of data files but allows the user to enhance spreadsheet analysis capabilities by upgrading Apple *VisiCalc* files to Lotus's *1-2-3* files on the pc. Requires Hayes Micro Modem II plug-in modem board, a Mountain Computer CPS Multifunction Card, a CCS Card, or a Super Serial Card for transfer. On the IBM side, requires any RS-232 interface card. $195.

Applied MicroSystems, Inc.
Roswell, GA

Intelecom. A fast menu-driven terminal package with the communications power of PCDI. Features include Xmodem, Xon/Xoff, APL, automatic dial-up and log-on, autosearch for available line/port, backward scrolling, data transmit/receive/capture, screen snapshot/redisplay, and on-line help. $99.

PCDI. An integrated package incorporating communications, data management, and color graphics in a single user-expandable system. With *PCDI*, you can easily dial into mainframes, information services, bulletin boards, and other personal computers and retrieve data. Retrieved data can be quickly graphed and passed to other programs. $250.

AST Research, Inc.
Irvine, CA

AST-BSC, AST-SNA. A 3270 software communications package (AST-BSC is bisync) that enables the pc to emulate a remote 3274 control unit with attached 3278 or 3279 display station. Optional software provides 3770 RJE workstation functions, supporting data transfer between the host and pc. Other options include cluster controller support for up to three pc's or ASCII terminals as additional 3278 stations. $895.

AST-5251. In *AST-5251* mode, the pc appears to the host as an interactive IBM 5251 Model 12 Display Station and a parallel

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IS02 **Insider™ Winchester System and Floppy Disk Controller (no vacant module slots) $1,295.00**

IS03 **Insider™ Winchester System w/RAM Memory Card that will hold up to 256K RAM (no RAM installed). (No vacant module slots) $1,295.00**

IS04 **Expansion Memory Module for Model IS03 to allow 320K additional RAM for a total of 576K (Module Only, no RAM installed) $129.00**

IS05 **Per 64K of RAM for IS03 and IS04 ..... $ 75.00**

IS06 **Multifunction Card with 6 vacant slots ..... $ 88.00**

MODULES FOR USE WITH IS01 AND IS06 ABOVE

IS07 **Parallel Port Module (Centronics Compatible) ..... $ 59.00**

IS08 **Serial Port Module (RS232) ..... $ 95.00**

IS09 **Clock Calendar Module w/battery $ 65.00**

IS10 **Game Adaptor Module ..... $ 55.00**

IS11 **Hard Disk Controller Module including software (requires 3 slots) $395.99**

IS12 **XT-ROM ..... $ 48.00**

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COMMUNICATIONS

printer attached to the pc will be supported as an IBM-type 5256 dot-matrix printer. Options include software to provide an interface for bidirectional file transfers between the pc and the host system. $895.

PCNet. A CSMA/CD base band local area network that allows pcs to share common files for database operations and costly hardware resources such as hard disks and printers. Includes file locking and remote execution. Uses CSMA/CD media access in a distributed bus topology, and has a data rate of 1Mbps. $695 per node.

AST-3780. A bisync communications package that emulates the functions of an IBM 2780/3780 RJE workstation. It allows interactive use by an operator or batch processing for unattended operation. Other features include command file configuration, transparent and nontransparent operation, dynamic device selection between disk, screen, and printer. $945.

Back Bay Micro
Burlington, MA

Hayes Compatible Smartmodem. Features additional printer port, battery backup clock, and serial port. All four functions are designed into one printed circuit card. The modem will perform with all Hayes software. The serial port can be switched to other functions when not driving the modem. $300.

Bizcomp Corporation
Sunnyvale, CA

PC:Intellimodem. A 1200-baud plug-in modem for the pc and XT. Features integrated voice and data communications, telephone directory, and a two-year warranty. $499.

Robert J. Brady Co.
Bowie, MD

Communications Networking for the IBM PC, by Larry Jordan and Bruce Churchill. This comprehensive summary of all aspects of data communications applications for the pc covers a wide variety of existing and projected data communications applications, including character codes. Provides the novice user with a thorough background in pc data communications. Covers both asynchronous and synchronous communications and local area networking extensively. $18.95.

Digisoft Computers, Inc.
New York, NY

Mailcom. Send more than 2,000 letters per hour, delivered in less than 48 hours, at $.26 a piece, from your computer, using the U.S. Postal Service's E-Com system. *Mailcom* is interactive, easy-to-use, menu-driven software, including a text editor, mailing list manager, set-up and format programs, and communications. $195.

Digital Marketing Corp.
Walnut Creek, CA

The Micro Link II. Conducts keyboard conversations, sends and receives electronic mail and exchanges any file (up to disk capacity). Saves all or selected parts of transmission to disk. Development of the *Micro Link II* was based on input from thousands of data communication users. $99.

direct.aid, Inc.
Boulder, CO

direct.connect. An intelligent terminal and transfer program for communicating with other computers and databases. The IBM user can capture data to disk file and send files to other computers. The program has programmable function keys, more than twenty-five different help screens, and up to 9,600 baud throughput. $145.

Electronic Data Systems
Dallas, TX

EDS Communicator/Text Editor. Communications and text editor program. Transfers files at 300 or 1200 baud using ASCII or Xmodem. Autoanswer or autodial and autolog-on to various networks. Stores up to 2,000 lines in memory for global command column monitor. $125.

ErgoSoft
San Diego, CA

p-Comm. An intelligent communications package for the UCSD p-System. Autodialing, phone directory, upload, download. Christensen protocol. 1200-baud operation. $95.

p-Comm 3.0. An update to the professional communications package for the UCSD p-System. Features upload, download, Xmodem file transfer, pacing, Xon/Xoff, throttling, phone directory, automatic logon, and terminal emulation up to 1200 baud. Autodialer sets com parameters. Requires NCI p-System version IV.1. (IBM p-System version also available). $95.

Frontier Technologies Corp.
Milwaukee, WI

Advanced Communications Board. Provides multiple protocol support. Programmable word lengths, stop bits, and baud rate (maximum baud rate 19.2K). Options include parallel port and serial port. $275.

X.25 Software. Will run on Frontier's Advanced Communication Board. Implements all three levels of CCITT X.25 specification with 1980 amendments. The software is developed in a higher-order language that is compatible with the pc operating system. $795.

Compac. Allows asynchronous communication through an IBM standard RS-232C interface or Frontier Technologies Advanced Communications Board. The program also implements bisync, HDLC/SDLC, and X.25 protocols on the Frontier Technologies board. Includes upload and download of ASCII files, user-definable function keys, and baud rates up to 19.2K. $125.

Gateway Microsystems, Inc.
Austin, TX

Microgate 2780/3780 Emulator. An integrated hardware/software product that enables the pc to communicate with other computers using the bisync protocol. Features both interactive and batch command modes, with multilevel help screens, and both synchronous and asynchronous operation to 4800 bps. $895.

MicroGate II 2780/3780 Emulator. An integrated hardware/software product that enables bisync communications to be built into custom software packages. Interfaces directly with MS-COBOL, permitting complete application program control of a communication session. $895.

Giltronix, Inc.
Palo Alto, CA

The Automatic Scanner. Allows keyboard or computer-program controlled sharing of a common device among numerous computers, terminals, and modems. Switches eight lines, RS-232C interface. Available with one I/O and three, five, or seven communication ports. Includes integral line drivers/receivers for improved data transmission. $359-$509.

Automatic Switching Unit. Selects peripherals in local or remote locations under keyboard or computer program control. Asynchronous, RS-232 protocol. Fixed or auto baud rate. Available with one I/O port and three, five, or seven communication ports. Includes integral line drivers-receivers for improved data transmission. $459-$609.

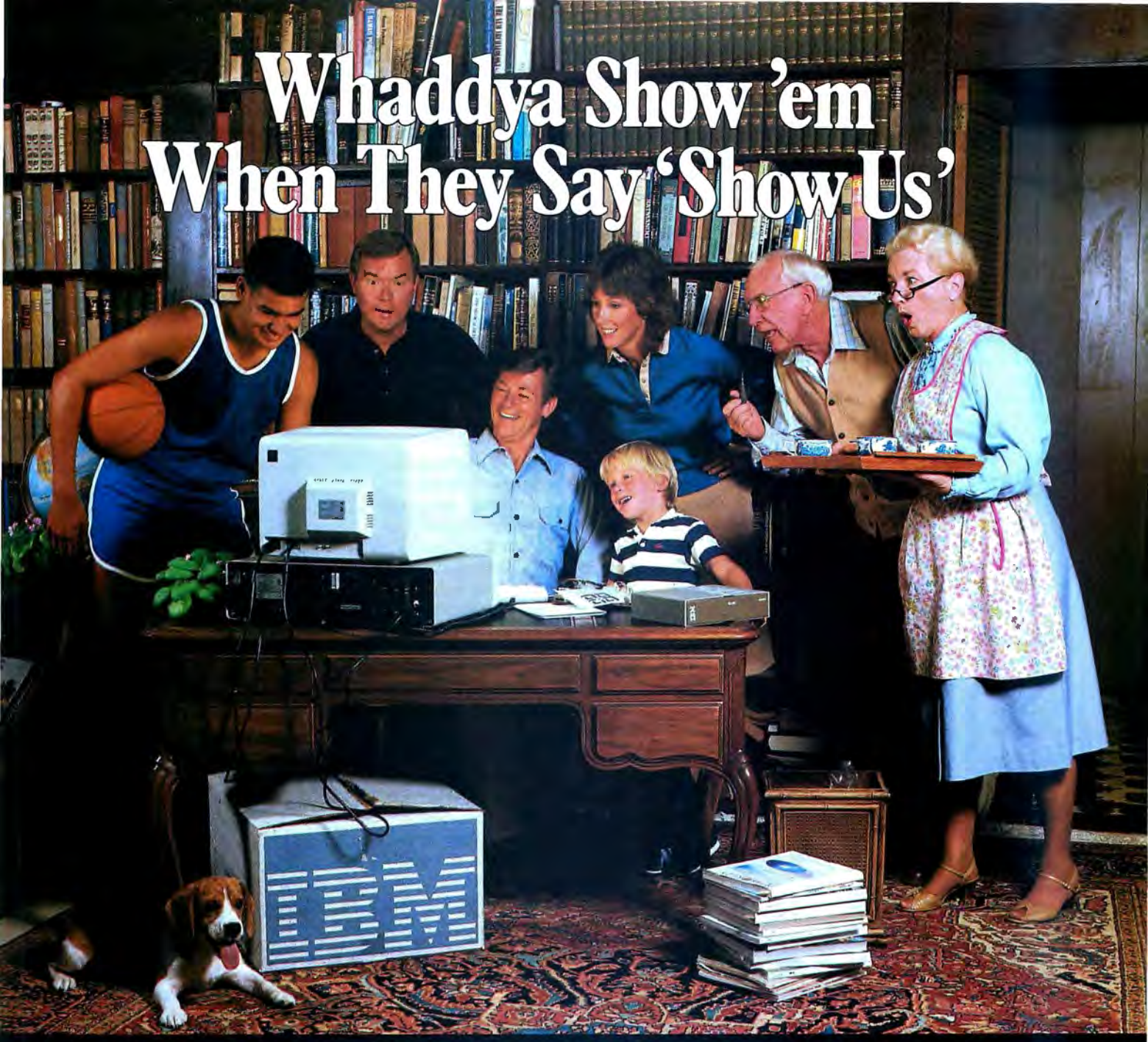
The Headlands Press, Inc.
Tiburon, CA

PC-Talk III. Uploads, downloads, and has a 60-entry autodial directory. Transmit options allow for transmitting binary files, line pacing protocol at 300 to 1200 baud. Forty possible permanent input strings. A 70-page user's guide is supplied on disk. $35.

IAS Corp.
W. Willington, CT

Genterm. Communications package for file transfers and communication with most any micro, mini, or mainframe computer. Offers autodial, autolog-on, and protocol customization. Buffered file capture enables receiving files larger than memory. Transfers seven- and eight-bit files with error checking. $79.95.

Whaddya Show 'em When They Say 'Show Us'



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Package includes spectacular visual effects, in high, medium, and low resolution graphics, plus examples of graphics applications on easy-to-use diskette. Also includes manual with over 30 pages of tips and techniques for achieving the same results for both beginning and advanced programmers.

Requires IBM-PC with graphics adaptor, 1 disk drive, 64K and DOS 1.1 or 2.0 (96K with DOS 2.0). Color display or television recommended.

SoftStyle™

COMMUNICATIONS

IDE Associates, Inc.
Bedford, MA

IDEAComm 1200. A 1200/300-baud communications card. Combines the functions of an in-board asynchronous communications card with an out-board modem in one integrated plug-in unit. A software disk allows menu-driven selection of all communications, autodial, and autolog-on procedures. *1200* works with most other terminal emulation packages including the IBM *Comm 2.0.* $545.

Inner Loop Software
Los Angeles, CA

VDTE 2. Emulates HP 2624, HP 2648, and VT52-type VDTs. Supports HP 2624 block mode and a subset of HP 2648 graphics. Ten speeds, including 9600 baud. Seven pages of scrolling memory per port. Includes ASCII file transfer system. $200.

Intelligent Technologies International Inc.
Palo Alto, CA

PC Express. A fully integrated communications package with software, tutorials, and pc board with 300-baud on-board modem. pc-to-pc, pc-to-mainframe communications emulating IBM 3274 cluster controller, 327X terminals, and 3370 RJE via SNA. DEC VT 100/52 terminal emulation. $895. With SNA, $1,295.

International Software Alliance
Santa Barbara, CA

Lync. Has menu-driven setup for the most popular CP/M computers: Lync IBM pc DOS, Victor 9000 MS DOS, and TRSDOS versions are machine dependent and come already set up. Requires 56k. $115.

Link Systems
Santa Monica, CA

DataLink. A telecommunications software that allows fast, simple, error-free communications computer-to-computer and computer-to-databases, time-sharing systems, bulletin boards, and so on. Transmit-receiver speed is 9600 baud from computer to computer or 1200 baud over telephone lines.

Micro Decision Systems
Pittsburgh, PA

LoadCalc. Converts text data downloaded from mainframes into WKS (*1-2-3*) or DIF files. Handles mixed text and values without special formatting or programming. $95.

Multi-Tech Systems, Inc.
New Brighton, MN

Multi-Modem. A complete 300/1200 baud communications system designed for use with the pc and XT. It consists of a single card modem that plugs into any expansion slot inside the computer. An extensive communications software package is included. $549.

Novation Inc.
Chatsworth, CA

Smart-Cat. 103 model operates at 110 baud and 300 baud; the 103/212 at 300 and 1200 baud, both full duplex. They have an RS-232 interface and can operate in autoanswer and autodial (touch-tone and pulse) modes. Both have an extensive software command set and automatic modem responses for dialing status. The 103 modem, $249; the 103/212, $595.

PC1200B. A smart modem designed to fit in a slot inside the pc or XT. It has an extensive software command set and sends automatic responses indicating line status. Operating at 300 or 1200 baud, the PC1200B has autodial, autoanswer modes, and self-test, analog and digital loopback tests. Packaged with Crosstalk XVI software program for $595.

On-Line Software International
Fort Lee, NJ

Omnilink. An integrated software package that allows IBM pc's, mainframes, word processing equipment, and other communications network devices to communicate intelligently. Enables the user to access and manipulate data that resides either in the mainframe or in the pc and exchange data between the two. Information can then be distributed throughout the entire communications network using Omnilink's electronic mail facilities. Price available upon request.

Orchid Technology
Fremont, CA

PCnet. A local area network allows sharing of expensive resources such as hard disks, printers, and communication lines. $695.

Personal Computer Products
Santa Clara, CA

Apple to IBM File Transfer Program. Allows the transfer of files from Apple II, II+, and IIe to the pc or XT. Includes communications program for the pc and Apple as well as an adapter that allows the two systems to connect. Contains several utilities that assist in program conversion and can aid in the preparation of files for editing. File concatenation is provided as well as the ability to send files of any length. Supported baud rates are 110 to 9600. $94.95.

TRS-80 to IBM File Transfer Program. A package that allows the transfer of files from the Radio Shack Model I, II, 4, 12, III, and 16 to the pc. Communications programs for both systems are included. Also included is an adapter that allows the two systems to connect, and a test communication file that verifies correct connection and proper transmission. File concatenation is provided and the ability to send files of any length. Supported baud rates from 110 to 9600. $89.95.

Persyst
Irvine, CA

PC/HASP. Used in conjunction with Persyst's DCP-88 communications processor, the *PC/HASP* program allows pc and pc-XT users to perform RJE/HASP functions with IBM and other HASP-compatible mainframes. Including DCP-88 front-end communications processor. $1,690.

PC/3780. Used in conjunction with DCP-88 communications processor, the *PC/3780* program converts a pc to an IBM 2780/3780 remote job entry workstation. PC/3780 software, $595. DCP-88 front-end communications processor, $695.

COAX/3278. Combines an 8088-based programmable controller with Persyst's *COAX/3278* program. Converts a pc to an IBM video display terminal. $995.

PC/3270. Used in conjunction with DCP-88 communications processor, the *PC/3270* program allows a pc to function as an IBM 3274 cluster control unit and 3278 terminal. *PC/3270* program, $595. DCP-88 board, $695.

Qubie' Distributing
Camarillo, CA

The Qubie' PC 212A/1200 Modem Card. An autodial, autoanswer modem that can send and receive data at 300 or 1200 baud. Four digital microprocessors insure accurate data transmission. The Qubie'Comm software included is Hayes compatible. $299.

ReadiWare Systems
W. Redding, CT

ReadiTerm. A comprehensive communications program that allows you to connect to other computers with a single keystroke. Turns a pc into an intelligent terminal that allows you to send or receive data from the Source, CompuServe, and other networks with ease. $75.

Rogue River Software
Medford, OR

The Odd-Couple. A set of machine-language programs that allow communications between a pc and Apple computer. Communications can be direct or through a modem at speeds up to 9,600 bps. Menu-driven for ease of use and can transfer any file. Communications can also be Apple to Apple or IBM to IBM. $79.95.

Smith Educational Engineering Service, Inc.
Arlington Heights, IL

Icomm. An intelligent communications

COMMUNICATIONS

package that turns a pc into a terminal for communicating with mainframes, other personal computers, and mini-computers. $150.

Software Connections, Inc.
Santa Clara, CA

LAN:Mail Monitor. Store and forward electronic mail software package for Corvus Omninet local area networks. Allows users to send letters and transfer files to each other locally or to users at other networks over the phone lines. Letters may be addressed to individual users or to predefined distribution list. $745-$1,195.

Software Products International, Inc.
San Diego, CA

Communications. This program allows your computer to communicate with the outside world through serial cable coupler modem or smart modem. Operate in a master/slave mode between two computers, as a terminal emulator for large systems, or as a user on a national network.

Solutions, Inc.
Montpelier, VT

VIS/BRIDGE/DJ. Transmits data from Dow Jones News/Retrieval directly into a *VisiCalc* spreadsheet. $295.

Starside Engineering
Rochester, NY

InterLync. An interactive terminal package for file transfer at 110 to 9600 baud. Interrupt-driven for zero data loss. Transfers files with ETX/ACK, Xon/Xoff, stream ASCII data capture, and Xmodem protocol. Twenty-six definable function keys, on-line help, on-line tutorial. $149. With APL EPROM, $199.

Transend Corporation
San Jose, CA

The Pc Modemcard. Has 110/300 baud capabilities and can be upgraded to 1200 baud with a plug-on 212 adapter card that requires no additional peripheral slot. Includes a simple terminal program for immediate communication. Supports autodial/autoanswer, pulse and touchtone capabilities. $269-$549.

Universal Barter Corp.
Los Angeles, CA

Dial Your Match Maintenance Program. Designed for use with the *Dial Your Match* bulletin board. Maintains passwords, address codes, system access codes, date of last call. Version 1.1, $15.95. Version 1.2, $29.95.

Universal Data Systems
Huntsville, AL

UDS 103LP O/A. A full-duplex modem operating at 0 to 300 bps over the dial-up network. Features originate/answer capability and derives operating power directly from the telephone line. No AC power needed. $145.

UDS 103JLP. A full-duplex modem operating at 0 to 300 bps over dial-up network. Features automatic answer and derives all its operating power from the telephone line. No AC power is needed. $195.

UDS 103J. A full-duplex modem operating at 0 to 300 bps over both dial-up and private lines. Features automatic answer and built-in diagnostics. $425.

UDS 202LP. A half-duplex modem operating at 0 to 1200 bps over dial-up lines. Derives its operating power from the telephone line.$195.

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Special Event Funding—projects the future cost of a wedding, purchase of a house, or other major purchases based on current costs and inflation rates. Displays alternative methods of financing for up to 5 events over a thirty-year plan. Prints a cashflow report for each method.

Fund Accumulation—Computes the future value of savings or retirement plan. Accommodates an existing balance, irregular contributions, various rates of return and interest compounding methods. Displays balance on date selected and amount of interest earned. Prints a monthly or annual cash accumulation report.

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COMMUNICATIONS

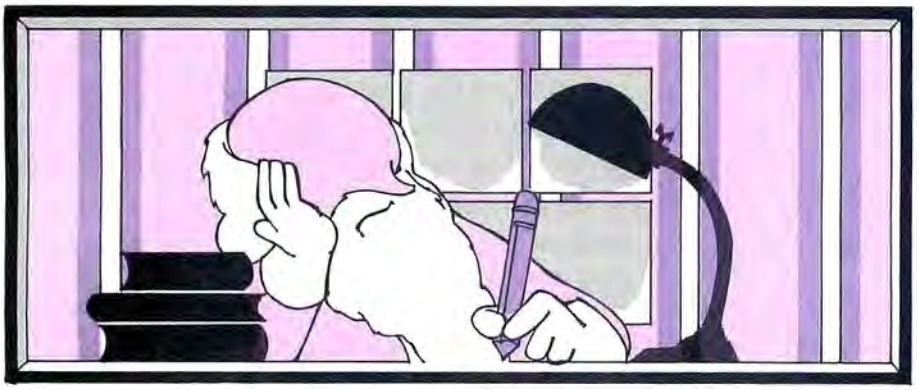
UDS 212A/D. A full-duplex modem operating at 0 to 300 and 1200 bps over the dial-up network. Features automatic dial, storage of phone numbers, battery-backed memory, menu of commands, pulse or tone dial, and single keystroke dialing. $645.
UDS 202SLP. A half-duplex modem operating 0 to 1200 bps over the dial-up lines. Derives all its operating power from the telephone line. $245.

U S Robotics, Inc.
Chicago, IL
Auto Dial 212A. A 300/1200 baud modem with autodial, autoanswer, half/full duplex, LED indicators, and analog loopback/self-test. Can be used with a variety of communication software, including TELPAC, Ward Christensen's public domain programs, AMCALL, and *Crosstalk*. $599.
Password. A 300/1200 baud autodial, autoanswer modem. Full/half duplex Bell 212A, 103, 113 compatible. Utilizes only 12 ICs on a single board design. May be used with a wide variety of communication software, including TELPAC, Ward Christensen's public domain programs, and *Crosstalk*. $449.

Visionary Electronics, Inc
San Francisco, CA
Visionary 100. Microprocessor-based data communications peripheral. Contains 300 bps direct-connect modem, internal RAM (2 -24k), and on-board clock. Works independently of computer. Download data from computer to *Visionary*, set transmission time, turn off computer, or otherwise engage it. All automatic features. Depending on memory, $595 to $760.

VM Personal Computing
New York, NY
Relay. Can send one file, receive another, edit a third, and print a fourth—all at the same time. $149.
Please. pc/mainframe link. Runs on an IBM mainframe and allows the pc with *Relay* to upload and download any kind of file. Full error detection and correction ensures faithful transfers. Can back up pc files on your mainframe system. $1,495.

Woolf Software
Canoga Park, CA
Move-it. A smart terminal and file transfer program for small computers running CP/M, CP/M-86, MS-DOS, and other operating systems. All commands can be controlled from one end, allowing communication to unattended computers. Features include transmission/reception of files, error-free transfers between *Move-it's*, support for autodial modems, local and remote directories/user numbers, and messages. Includes configuration and help utilities. $125 to $150.



EDUCATION

American Training International
Manhattan Beach, CA
Command Power for WordStar. Teaches the advanced functions of *WordStar* in less than three hours while providing practice with real *WordStar* commands. Recommended for persons who have completed *Menu-Power for WordStar*, Vol 1. $45.
Menu-Power for WordStar, Vol 1. Teaches the use of *WordStar* in less than one hour while providing practice with real *WordStar* commands. Features an interactive training disk and a tabbed handbook. $45.
Training Power. A series of programs that teach basic computer subjects while providing hands-on practice. An interactive training disk and tabbed handbook teach usable skills. Versions are available for *BPI General Accounting, Benchmark, CP/M, dBase II, EasyFiler, EasyPlanner, EasyWriter II*, MS-DOS, MBasic, *MicroPlan, MultiPlan*, PC-DOS, *SuperCalc*, and *VisiCalc*. $75 each.

Behavioral Engineering
Scotts Valley, CA
Letter Man. Hungry gobblers chase you around a maze at ever-increasing speeds. You move by typing the letters that fill the maze. Learn to type while you are playing. $34.95.
Typing Strategy. Teaches you to type as quickly and accurately as a professional typist. Animated hands and keyboard show you which key to press and which finger to use. Games and exercises help to increase your speed and accuracy. $34.95.

Blythe Valley Software, Inc.
Oakhurst, CA
Milky Way Merchant. A trading strategy game in which you make deals for profit, identify markets and their needs, and plan your trading route. Beginning players may use the automatic set-up feature, while advanced players may set up their own variations of the game. $34.95.
(Spel': bound). A comprehensive package of programs that may be used by parents or teachers to support any spelling program. There are thirteen activities that present word scrambles, mazes, games, and spelling correction. The data disk my be changed to accommodate any reading level. $79.95.

Cardinal Software, Inc.
So. Hamilton, MA
Micromentor Learning System. Educational software for home or school. Organizes the acquisition of material into both long- and short-term memory using two different methods of learning. Long-term learning is facilitated by a process called adaptive reinforcement. This is the selective recall of material from a database over an extended period of time, during which the learner's retention spans are automatically measured and the recall schedules adapted accordingly. Short-term memorization is addressed by a process analogous to flash-card learning. The learner proceeds at his/her own pace so that accomplishment is maximized and boredom is minimized. Database subjects include the SAT, French, Spanish, homonyms, and biology. $125. Databases, $50 each.

CBS Educational and Professional Publishing
New York, NY
Programming the IBM Personal Computer: Basic, by Neill Graham. From switching your pc on to editing text, handling random and sequential files—even making music—this easy-to-follow book shows you how. $17.
Programming the IBM Personal Computer: Fortran 77, by Robert Rouse and Thomas Bugnitz. Examples, problems, and exercises from science and engineering illustrate both introductory and advanced topics, including

EDUCATION

IBM's Fortran compiler. $17.

Programming the IBM Personal Computer: Pascal, by Neill Graham. Accessible to beginners, this structured presentation shows how to program with the powerful compiler Pascal developed by IBM for the pc. $16.95.

Programming the IBM Personal Computer: UCSD Pascal, by Seymour V. Pollack. A self-paced introduction to UCSD Pascal (and programming) on the pc, using the UCSD p-System. Many examples and problems, both serious and whimsical. $17.

Using the IBM Personal Computer: WordStar, by CJ Puotinen. Even for those unfamiliar with the pc, this book's many examples and projects will easily lead to mastery of the *WordStar* word processing system. $16.95.

Using the IBM Personal Computer: VisiCalc, by Robert Crowley. Learn *VisiCalc* step-by-step on your pc; work on projects—some easy, others not—in a wide range of application areas. $19.95.

Your IBM Personal Computer: Use, Applications, and Basic, by David E. Cortesi. An elementary, nonthreatening introduction to the pc. Includes setup and testing, disk files, *VisiCalc* and other software, and the rudiments of Basic. $17.

Cdex Corp.
Los Altos, CA

How To Use Your IBM PC or PC-XT with PC DOS. Learn the full range of PC-DOS commands and the full range of special keys on the XT keyboard. Introduces other operating systems such as CP/M and Unix, the Basic programming language, and applications software. Comes with four interactive tutorial disks and a user's guide to train the first-time or experienced user. $69.95.

How to Use Your IBM PC or PC-XT with CP/M 86 and Concurrent CP/M 86. Learn to use the full range of CP/M 86 and Concurrent CP/M 86 commands and the full range of special keys on the XT keyboard. Introduces other operating systems such as PC-DOS and Unix, Basic, and applications software, which can help you get the most out of your pc or XT. Comes complete with four interactive tutorial disks and a user guide. $69.95.

Training for the IBM PC DOS 2.0. Provides comprehensive instruction in both beginning and advanced DOS commands for the new and experienced pc user. The package consists of three interactive tutorial disks and a reference guide. $69.95.

How to Program in BASIC on your IBM PC. For the nonprogrammer who wants to write customized software for the pc. Minimal background in programming is assumed. Learn important Basic commands and statements and some general rules of programming. The package comes complete with two interactive tutorial disks and a reference guide. $69.95

CMA Micro Computer
Yucca Valley, CA

The Teacher PC. Trains the user on the operations of PC-DOS, DOS utilities, and the three levels of Basic. Comes with instructional manual and study guide. $149.95.

Comprehensive Software Support
Redondo Beach, CA

DB Tutor. Teaches you everything you need to know about databases and takes you through introductory tutorials on *1-2-3* by Lotus, *dBase II* by Ashton-Tate, and *TIM* by Innovative Software. In addition, a database system called *PC Base* is included in this package. $95.

PC Pal. Introduces the first-time computer user to the IBM pc. *PC Pal* is actually five programs in one: (1) The pc keyboard, (2) Spreadsheets, (3) Word processing, (4) The Basic interpreter, and (5) Hardware. $39.95.

PC Tutor. Instructs on computer concepts, disks, files, and devices and delves deeply into

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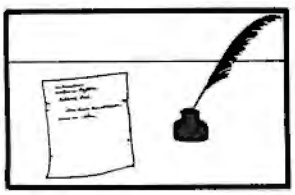

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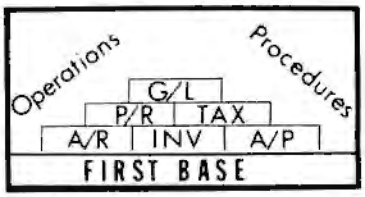

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MS-DOS commands and topics. The total package consists of an easy-to-understand instruction manual and a disk. $59.95.

Computer-Advanced Ideas
Berkeley, CA

The Game Show. Teaches information and essential thinking skills in a game of clues and target concepts. Authoring system tailors *The Game Show* to children's educational needs. Ready-made subject disks offer over thirty topics each. $39.95.

Master Match. Match wits with the computer or a friend as *Master Match* quiz show emcee invites you to find logical matches in images and words under numbered mystery squares. Players use visual memory, factual knowledge, and reasoning skills to win points. $39.95.

Tic Tac Show. An animated quiz show emcee interacts with one or two players of any age as the program entertains, motivates, and teaches. *Tic Tac Show* comes with lessons in fourteen subjects, from myths to math. $39.95.

Computer Labs of America, Inc.
San Diego, CA

Startup. Includes all the necessary tools to provide rapid learning with hands-on instruction of Lotus's *1-2-3, VisiCalc, SuperCalc, WordStar,* PC-DOS, *dBase II.* Review notes included. Each disk $199.

Counterpoint Software, Inc.
Minneapolis, MN

Early Games for Young Children. A set of nine games designed to teach children ages 2 1/2 to 6 basic skills: matching numbers, counting blocks, adding and subtracting stacks of blocks, matching letters, working with the alphabet, typing names, comparing shapes, and drawing colorful pictures. No adult supervision required; picture menu gives children control. $29.95.

Early Games Music. Four games encourage children ages 2 to 12 to experiment with music. They learn to play tunes or make up their own using the computer to record and play back the music. They are introduced to note names and the keys of the piano and can combine graphics with their music. $29.95.

Piece of Cake. At the bakery, children learn to add, subtract, multiply, and divide cakes as they come out of the oven. In *Catchacake* players go through the same operations—at high speeds, so the cake won't splat on the floor. Challenging fun for elementary ages. $29.95.

Fraction Factory. At the *Fraction Factory* children can see and describe fractions, find equal values with different denominators, multiply whole numbers by a fraction, and add and subtract fractions. Third through sixth grade mathematics textbook objectives. Colorful graphics and musical sounds help children visualize and understand the concepts. $29.95.

Matchmaker. Playfully guides children through a series of discrimination games involving colors, shapes, sizes, and directions. Musical sounds and colorful graphics help children understand why their responses are right or wrong. Matching games are fun for learning prereading skills. Even two-year-olds need no adult supervision. $29.95.

Quizagon. A family game, or a party game, that challenges players with over 6,000 questions in the categories of the sciences, sports, entertainment and arts, and potpourri. Two disks, four sides to this game of knowledge, strategy, and luck. $39.95.

Courseware, Inc.
San Diego, CA

PC Master. Allows users to teach themselves to use their pc, provides an overview of the many practical applications for the personal computer, and gives users hands-on experience with the four most widely used applications—word processing, database management, communications, and spreadsheets. $79.50.

Davidson & Associates
Rancho Palos Verdes, CA

Speed Reader II. A complete reading course. Its exercises will build speed and comprehension with just thirty minutes practice per day. *Speed Reader II* contains five activities with thirty-five interesting reading selections, each with questions to check comprehension, an editor that allows you to enter your own selections, and a grade-level analyzer to determine reading level. $69.95.

Word Attack. A vocabulary-building system with four educationally well-designed and graphically appealing exercises, including a fast-paced arcade game. Words and sentences illustrating usage are presented on nine different levels (ages 8 through adult), using data files of 675 words. It contains an easy to use editor. Additional data disks are available. $49.95.

Math Blaster. Presents addition, subtraction, multiplication, division, fractions, and decimal operations in exercises that include a fast-paced arcade game. Extensive data files contain over 600 problems for students ages 6 through 12. *Master Blaster*'s editor makes it easy to enter additional problems. $49.95.

DesignWare, Inc.
San Francisco, CA

Creature Creator. An educational game that allows children to create dancing creatures and practice pattern analysis, a skill basic to reading and mathematics. Once formed, the creature can be easily programmed to hop, stomp, wave, roar, and make other motions. The child can then play a game with the computer in which the computer makes one creature dance and the child must program his or her creature to do exactly the same dance. While this was designed for children four years and older, at the most difficult level it is a challenging game even for adults. $39.95.

Crypto Cube. Designed for players 8 years and up. A challenging word puzzle game for one or more players. The game has a rotating cube, four sides of which have a grid similar to that found in a crossword puzzle. Hidden behind the squares of the grid are the letters of the words. Players take turns uncovering the letters and trying to guess the words. *Crypto Cube* comes with fifty lists of 20 words each, grouped by categories such as animals, artists, writers, countries, and food groups. You can also create your own list, from which the computer will generate a variety of puzzles. $39.95.

Spellicopter. An action spelling game for children 6 years and up that tests spelling skills and visual memory. Pilot your helicopter through skies crowded with balloons, thunder clouds, and other obstacles in order to rescue the stranded letters and carry them back to the landing pad. Each spelling word has a context sentence associated with it. If you misspell the word, the correct spelling is displayed. Included are the 400 most commonly used English words. $39.95.

Developmental Learning Materials
Allen, TX

Arcademic Skill Builders in Math. Alien Addition, Minus Mission, Meteor Multiplication, Demolition Division, Alligator Mix (addition and subtraction), Dragon Mix (multiplication and division). Fast action and colorful graphics of an arcade game. Features a combination of microcomputer software and print materials. Separate skill builders, $39. Total program, $220.

Digital Marketing Corp.
Walnut Creek, CA

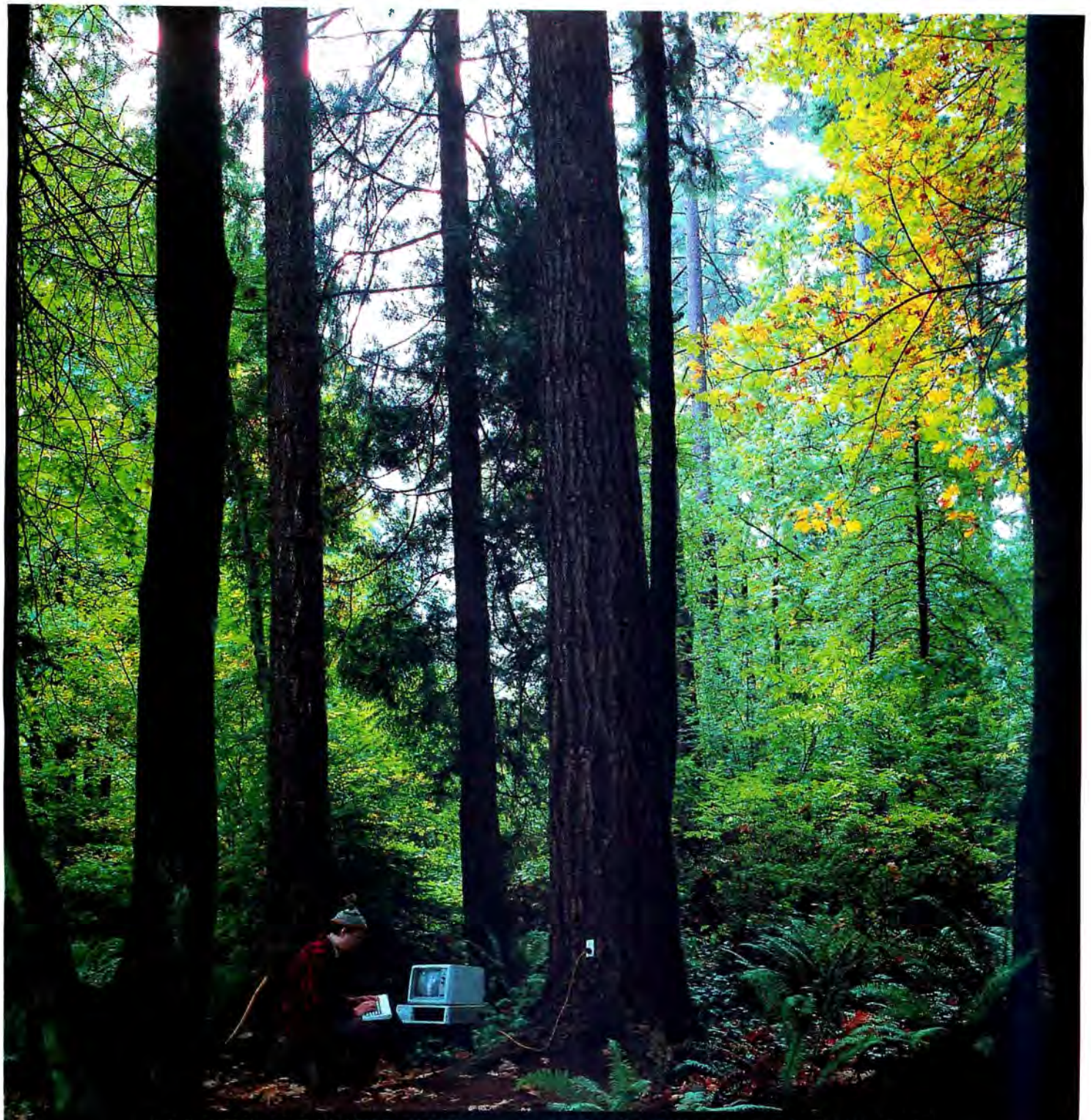
Hyper Typer. A personal typing teacher for anyone who needs to type quickly and accurately. *Hyper Typer* teaches the fundamentals of typing or helps transfer skills from the typewriter or ten-key pad to computer keyboard. $29.95.

Edu-Ware Services, Inc.
Agoura Hills. CA

Algebra, Volumes 1 through 3. Offers a selection of learning styles. Work sample problems, solve equations step-by-step, study rules, or read discussions of concepts. Hi-res color displays flowchart progress. $39.95.

Electronic Courseware Systems, Inc.
Champaign, IL

Aural Skill Trainer. Designed to improve au-



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This is a system you can grow with. All the tools to meet your new programming requirements are available from NCI. In addition to the IBM PC, the NCI Practical Pascal Package is compatible with Corona, Columbia, Eagle, Compaq and Hyperion.

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EDUCATION

ral skills in the perception and identification of intervals, basic chords, and seventh chords. Hard-copy instructor reports available with printer. Diagnostic information is available to the learner at the completion of each lesson. $99.95.

Basic Chords. Designed to improve aural skills in the perception and identification of basic chords. Hard-copy reports may be obtained with the use of a printer. Diagnostic information is available to the learner at the completion of each lesson. $39.95.

ECS Computerized Gradebook. Designed to provide a statistically accurate method of keeping students' scores and assigning grades. Up to fifty names, ten scores each. Computed final score and letter grades, conversion to standard scores, scores individually weighted, distribution of any score set with mean and standard deviation, letter grades assigned. $49.95.

Elements of Mathematics. For individuals interested in teaching mathematics fundamentals using computers. Includes adding fractions (common denominators), adding fractions (unlike denominators), reducing fractions, and student recordkeeping option. $49.95.

Elements of Music. For individuals interested in teaching music fundamentals using computers. Developed for use with children and nonmusic majors who wish to learn the elements of music at an entry level. Includes note names, pitches on the keyboard, key signatures, and student recordkeeping. $99.95.

Intervals. Designed to improve aural skills in the perception and identification of intervals. Hard-copy reports may be obtained with the use of a printer. Diagnostic information is available to the learner at the completion of each lesson. $39.95.

EuroPro, Inc.
Petaluma, CA

TMGame. Sharpens children's and adults' math skills. Four functions available (addition, subtraction, multiplication, division) with three levels of difficulty. *TMGame* includes a graphical timer, multicolored animated screens, and classical music. Includes one disk and instructions. $30.

Edubas I. Designed for those who want to learn how to program the pc in Basic. *Edubas I* includes three disks with lessons, exercises, and instructions. $95.

Edubas II. A complement to *Edubas I* that unlocks the advanced functions of Basic such as file manipulation, strings, and graphics. *Edubas II* includes three disks with lessons, exercises, and instructions. $95. *Edubas I & II* $170.

Edubas III. A pc Basic trainer and complement to *Edubas I & II.* Teaches the additional features available in the new Basic 2.0. *Edubas III* includes one disk (320K) with lessons, exercises, and instructions. $50. *Edubas I, II, & III*: $190.

Fliptrack Learning Systems
Glen Ellyn, IL

How to Operate Your Computer Under CP/M-86. An audio tutorial for first-time CP/M-86 users. Consisting of three audio cassettes and an indexed operator's guide, the course steps the user through the most important CP/M-86 commands and procedures for managing disk storage and creating and handling files. $75.

How to Operate the IBM PC-XT. An audio tutorial with four cassettes. After course completion, participant will be able to use the keyboard and PC-DOS version 2.0 commands; format, copy and check disks; copy, rename, and delete files; print spooling; use a fixed disk drive; use tree-structured directories; create batch-processing files, text files, and Basic program files. Includes operator's guide. $75.

How to Operate the IBM Personal Computer. A carefully sequenced audio-tutorial with three cassettes. After course completion, participants will be able to set up the computer and use the keyboard and PC-DOS 1.1 or 2.0; format, copy, and check disks; copy, rename, and delete files; use a hard disk drive; and create batch-processing files, text files, and Basic program files. Includes users' guide. $57.

How to Use EasyWriter II. A carefully sequenced audio tutorial with three cassettes. After course completion, participant will be able to create documents, edit documents, format documents, print documents, and use essential EasyWriter commands. Includes user's guide. $57.

How to Use Lotus 1-2-3. Will quickly have you creating your own models, using the *1-2-3* database, and graphing your results. Step by step, you'll learn about worksheet commands, printing, and graphing. Designed for either the intermediate or first-time computer user. $75.

Focus Media, Inc.
Garden City, NY

The Basics of Basic. Complete package of twelve lessons guides you through introductory Basic programming in easy-to-follow screens with beautiful graphics. Extensive documentation with review is provided. $99.

Friendlysoft, Inc.
Arlington, TX

PC Introduction Set. The three diskette cure for computer phobia. Includes four demonstration programs, seventeen learning games, and eight home finance utilities. $49.95.

Harvard Associates, Inc.
Somerville, MA

PC Logo. A full implementation of the Logo language for the pc. An ideal interactive language with graphics, fully integrated editor, list structure, and recursion. Complete tutorial and technical manual included with language and utilities disks. Runs with MS-DOS in 64K, expandable to 128K. $199.95.

Turtle Tot. A small, programmable robot that runs in Basic and Logo. Moves, blinks its "eyes," sounds its two-note horn, and draws. With its built-in RS-232 port, the Tot is controllable from virtually any microcomputer. Comes complete with ten-color pen set, complete instruction manual. $299.95.

Individual Software, Inc.
Redwood City, CA

Tutorial Set. An interactive, self-paced, two-part course that teaches first-time and advanced users how to operate and use the pc. The *Instructor* teaches initial operating stages, including how to get information in and out of the pc, how to boot the system, and more. *Professor DOS* teaches the DOS commands, concepts, and applications, including using DOS 2.0. Each program uses menus, graphic illustrations, and allows users to practice and experiment freely. Includes user handbook. $94.95.

The Instructor. A pc-familiarizing tool that takes the novice through the initial operations stages. Through a series of graphic-supported presentations, *The Instructor* teaches the use and operation of function keyes, control keys, and the numeric keypad, as well as the typewriter keys. Users learn how to perform basic system functions, how to use menus, and how to perform special key commands to transport themselves from one set of lessons to another. Exercises are presented lesson-to-lesson or can be selected from a menu. Includes a user's guide. $44.95.

Professor DOS. An interactive, self-paced, menu-driven program that teaches DOS to both novice and experienced users. Simulating DOS operations, the program guides users step-by-step through each DOS command, including DOS 2.0, Edlin, DOS concepts and applications, and DOS editing functions. Users are free to experiment and practice as they learn. Uses graphic images, sound, and color. Comes on two interactive disks and includes a user's guide. $59.95.

Inet Corp.
Sunnyvale, CA

SpeedRead+. Teaches rapid reading. Anyone who reads, whether for pleasure, school, work, or just to keep abreast of developments in a profession or hobby, can benefit from *SpeedRead+*. Read from 5 to 5,000 wpm. $79.95.

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Now, before you start thinking that IBM's hard disk is better than ours, remember that IBM doesn't make their own hard disk for the IBM XT. They go into the marketplace, just like we do, and strike the best price they can. If you were to buy an IBM XT, your hard disk might come from one

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But the hard disk is not the whole story. It takes a controller card to get your files from the hard disk to your computer so you can use them.

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EDUCATION

Jefferson Software/Systems Design Associates, Inc.
Charleston, WV

Career Directions. For those who are preparing to enter college or are entering the job market. The occupational database used in *Career Directions* analyzes student interest for more than 460 specific occupations that range from high-level professions to entry-level jobs. *Career Directions* can be used as either a standalone career guidance program or in conjunction with other guidance programs currently being implemented. $59.95.

Krell Software Corp.
Stony Brook, NY

Krell's Basic Educational Skills Tutor Instructional Modules: Mathematical Topics. Multidisk series teaches basic concepts and ideas of mathematics. Each of these programs maximizes student-computer interactivity to foster understanding and to guide progress as students demonstrate mastery of the lexicon of mathematics. Instruction and testing materials are systematically coordinated in an entertaining context to ensure student involvement. $899.

Plato's Cave. For aspiring scientists of all ages. Players probe *Plato's Cave* with light beams as they explore the relation between illusion and reality and the relation between evidence and inference. Difficulty levels suitable for all. $49.95.

Botticelli. A new approach to a classic game. Players compete to teach the computer how best to interrogate their opponents to discover which famous people, characters in fiction, mythological beings, animals, places, or things their fellow players are thinking of. A delightful introduction to the world of artificial intelligence and the art of questioning. Variety of subject areas. $34.95.

Adventures in Flesh, by Fred Williams, informs players, ages 12 and up, about the details of human anatomy and physiology. Adventure game format. $49.95.

Isaac Newton and *F. G. Newton. Isaac Newton* challenges players to assemble evidence and discern the underlying "laws of nature" that have produced this evidence. Players propose experiments to determine if new data conform to the laws of nature. *F. G. Newton* presents all data in graphic form. Players select difficulty levels from child to skilled adult. $49.95.

Time Traveler. Using the Time Machine, players face a series of historical environments in which they build alliances and struggle with ruling powers. Each game confronts players with complex decisions and demands for real-time action. $24.95.

Odyssey in Time. An advanced form of *Time Traveler,* adding ten historical eras. Each game is different and may be interrupted and saved at any point for later play. The player must now contend with the Adversary. Like the player, the Adversary also moves through time and space. $39.95.

Linear Equations. Thorough introduction to the world of linear equations. Join Detective Ranch Holmes as he explains the most elementary concepts about equations: what they are, how we use them, how we build them, and how we solve them. Designed for self-instruction. $119.95.

The Learning Co.
Menlo Park, CA

Magic Spells. Children spell and unscramble words with fourteen word lists. Players can tailor the game to any level by creating their own lists. Ages six to ten. $34.95.

Moptown Hotel. In seven increasingly challenging games children test hypotheses, use analogies, and develop strategic thinking skills. Children arrange Moppets in Moptown's fantasy world. Sequel to *Moptown Parade.* Ages nine to adult. $39.95.

Moptown Parade. A progression of seven playful games designed around colorful mopped characters teach logic, strategy development, and pattern recognition. Children arrange and match Moppet characters in the imaginary world of Moptown. Ages six to ten. $39.95.

Learning Tools
Cambridge, MA

Curriculum Management System. Centralizes and coordinates instructional and service resources, including textbooks, learning activities, library materials, films, and so on. Can be used to create individualized plans. $295.

Individualized Planning System. Locates, manages, and organizes user-defined information on each individual client or student. Prints individualized plans. Confidentiality is maintained through password and authorization levels. $495.

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Mace, Inc.
Madison, WI

Statistician's Mace. Calculates descriptive statistics, multiple regression, correlations, several analyses of variance, nonparametric tests, and other statistics used by scientists, business researchers, engineers. Accepts keyboard or disk file input. Requires 128K. Evaluation version, $30. Complete package, $195.

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Highland Park, CA

Highrise. Build a tower of blocks. Twenty levels of block balancing and fun. Play against the clock or instructor mode with no time and scoring. $30.

English SAT. Fast, effective way to improve verbal SAT scores. $30.

Math SAT. Fast, effective way to improve math SAT scores. $30.

Morgan Computing Corporation
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Math Wizard. Arithmetic problem-solving for the early school child. Random generation of problems. Up to five difficulty levels. Uses color and sound (both optional). At the higher levels uses the natural order of result input. Requires 64K RAM. $19.95.

NorFork Systems
Laurel Springs, NJ

Word-Score. Challenging Hang-man type word game. One to four persons can play, each at their own level of difficulty; 800 words supplied in first four levels. Fifth level enables parent or educator to preload specific lesson words. Requires color/graphics. BasicA. $29.95.

Opportunities for Learning, Inc.
Chatsworth, CA

A catalog of educational software designed for the home, with courseware covering math, science, language arts, programming, history, and games for the family. Featured are the new generation of learning games, which are ideally suited for home use. The catalog is free upon request.

Personal Tutor Associates
Clinton, MD

WordStar Tutor. An audio instructional course for *WordStar.* Contains three ninety-minute cassettes. $49.95.

dBase II Tutor. An audio instructional course for *dBase II.* These three ninety-minute cassettes offer a guided tour designed to help you set up your own business labels program and database. $59.95.

Psychotechnics, Inc.
Glenview, IL

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EDUCATION

for math reinforcement, for children in grades two to six. Features: Plumb Crazy:1, Geoterm, Totem Pole Toppers, and Witch's Brew. $39.95.

Telemath Disk 3. Four arcade-style programs for math reinforcement, for children in grades three to six. Features: Pic-n-Plot, Line Up, Move and Measure, Coin Connection. $39.95.

Telemath Disk 4. Four arcade-style programs for math reinforcement, for children in grades four to six. Features: Dyn-O-Mite: 1, Multiplication Baseball: 2, Jump Daredevil Multiplication, Dewey Packum. $39.95.

Telemath Disk 5. Four arcade-style programs for math reinforcement, for children in grades three to six. Features: Jump Daredevil Subtraction, Kingpin Decimals, Dribble Division, Multiplication Baseball:1. $39.95.

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Telemath Disk 8. Four arcade-style programs for math reinforcement, for children in grades four to eight. Features: Dyn-O-Mite:2, Jump Daredevil Division, Target Practice:2, Fraction Football. $39.95.

Telemath Disk 9. Four arcade-style programs for math reinforcement, for children in grades four to eight. Features: Dyn-O-Mite:3, Jigsaw Fractions, Jump Daredevil Fractions, High Stakes. $39.95.

Telemath Disk 10. Four arcade-style programs for math reinforcement, for children in grade eight. Features: Tic-Tac Subtract, Search and Score, Divide and Conquer, Bridge It. $39.95.

QED Information Sciences, Inc.
Wellesley, MA

The Instructor. Self-teaching software for the pc. Transforms the pc into an interactive self-teaching tool for new users. It is designed for office, home, classroom users. $44.95.

S-C Software Corp.
Dallas, TX

S-C Elementary Math Disk. Helps children with their addition, subtraction, multiplication, and division. Includes a long division demonstrator, and both text and lo-res graphic flash cards. $15.

Scarborough Systems, Inc. (Lightning Software's MasterType)
Tarrytown, NY

MasterType. Typing instruction in an exciting video game. Defend your command ship by typing the enemy words correctly or have the words zap you. Eighteen progressive lessons, graduated from home letter recognition to nine-letter words, numbers, and Basic programming words. Ability to create your own lessons. Created for all ages. $49.95.

SimSoft, Inc.
Port Huron, MI

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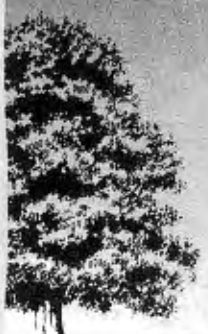

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SEI SAT Skills. Aids to students preparing for college board exams such as PSAT, SAT, GRE. Sentence completion, word analogy, and vocabulary are covered on three disks; two math disks cover fractions to trigonometry, including computer graphics. Available separately for $30 or as a set for $110.

SEI Foreign Language Set. This four-disk set focuses on knowledge of vocabulary of French, Spanish, and German at the beginning to intermediate levels, and on knowledge of foreign words in English. Each disk contains approximately 800 words and phrases, and the SEI authoring system can be used to expand the database. Available separately for $30 or as a set for $110.

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History and Government Series. The ten disks in this series provide review, reinforcement, and insight into world history and world government for students at the high school to first-year college level. U.S. history and government are emphasized. Available separately for $25 or as a set for $215.

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Softeach. A computer-aided instruction package for the UCSD Pascal programming language. *Softeach* progresses step-by-step

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TK!SolverPack for Introductory Science. Designed for use with the *TK!Solver,* covers topics in chemistry, biology, physics, thermodynamics, and population studies at the high school and college level. Contains twelve models with the equations, values, and tables needed to solve particular problems in these fields. $100.

The Soft Warehouse
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muMATH. A symbolic math system used as an interactive tool in scientific, engineering, and educational applications. Performs symbolic math like a super calculator: from exact rational arithmetic through calculus, trigonometry, and matrix algebra. The accompanying programming language *muSIMP* can be used, along with the resident display-oriented editor, to extend *muMath* or create totally different applications. A detailed reference manual and interactive, on-line lessons are provided. $330.

Spinnaker Software Corp
Cambridge, MA

Delta Drawing Learning Program. Children create colorful drawings on the computer screen by using single key commands to control the cursor. The program can be used in graphics or text mode. $49.95.

Snooper Troops I and *II.* Learning adventures. Players are private detectives trying to determine who perpetrated the crime and what the motive was. Players drive around town, question suspects, search house for clues, and use a Snooper computer. $44.95.

Hey Diddle Diddle. Three-part learning game that introduces children to Mother Goose lore. $29.95.

Rhymes + Riddles. A letter-guessing game presented in three formats: nursery rhymes, riddles, famous sayings. $29.95.

Alphabet Zoo. A combination of two maze games that teach the relationship between sounds and letters and sharpen skills. $29.95.

FaceMaker. A three-part learning game in which a child completes a blank face, animates the face, and plays a Simon Says game with the computer. $34.95.

In Search of the Most Amazing Thing. The player in the role of the B-liner pilot goes in search of the most amazing thing in the land of Darksome Mire. Each time the player solves this educational adventure, the clues and the location of the Most Amazing Thing change. $39.95.

Kindercomp. A collection of six learning games that prepare a child to read, spell, and count. $29.95.

Story Machine. A learning game in which a child writes a story with a supplied vocabulary and the stories are animated. Stories can be saved to disk. $34.95.

Stone and Associates
La Jolla, CA

My Letters, Numbers, and Words. An educational software package for children from one to five. Children learn the alphabet, numbers, and the concept of words through animated flash-card routines. $39.95.

Sunburst Communications, Inc.
Pleasantville, NY

The Pond: Strategies in Problem Solving. A small green frog lost in a pond of lily pads helps students/users recognize and articulate patterns, generalize from raw data, and think logically. Six levels of difficulty are provided. Color/graphics card, color monitor. Package includes one disk, one backup disk, one teacher's guide. $49.

The Factory: Strategies in Problem Solving. Color graphics and animation are used in this three-level program. Challenges students to create a geometric product on a simulated assembly line that they design. Focuses on several problem-solving strategies, including working backward, analyzing a process, determining sequence, and applying creativity. Package includes one disk, one backup disk, and a teacher's guide. $49.

M-SS-NG L-NKS: A Game of Letters and Language. Language puzzles improve students' reading, writing, grammar, and comprehension skills. Helps develop an appreciation of syntax, vocabulary, and the mechanics of writing. Passages from nine classics of children's literature are offered. There are nine difficulty levels permitting the creation of over 500 different puzzles. Package includes one disk, one backup disk, and a teacher's guide. $49.

Meet the Computer: Beginning Basic IBM-PC. A how-to program designed for students and teachers who want to develop computer literacy from the beginning or brush up their computer skills. Package includes quick-reference folders for programmers, reproducible graphs and charts for plotting and keeping records, and disks with answers and additional activities. $29.

Systech, Inc.
Bartlesville, OK

Math Tutor. A complete math education program for children from 6 to 16 years of age. Provides randomized addition, subtraction, multiplication, division, and fraction skills at various skill levels. Many math games with colorful animation and music. $39.

Systems Plus, Inc.
Palo Alto, CA

Flypchart. A simple-to-use, easy-to-set-up education, sales, training, and documentation tool. Information unique to the user's own requirements is presented through flip-chart-style screens in three modes: interactive, self-paced, and automatic. Comes with on-line instructions and help files. $175.

Taurus Software Corp
Fremont, CA

CP+. Training course for new computer users who are not familiar with the basic operations of a microcomputer system. *CP+* is also a combination of control and file management utility programs. It provides simple communication between users, the computer operating system, and application programs through English-language directions. $150.

Term Computer Services
New Providence, NJ

The Mr. Math Arithmetic Tutor. Allows students to practice basic arithmetic skills at their own level. Randomly generated problems at different levels of difficulty. All problems worked out directly on screen. Step-by-step solutions for problems missed. Report card summarizes problems attempted and number solved at end of session. $29.95.

Wadsworth Electronic Publishing Co.
New York, NY

Algebra Arcade. Teaches algebra to math and video game enthusiasts as well as to students of both algebra and analytical geometry. It is a graph game in which a player scores points by inputting an equation whose line or curve intersects and destroys the greatest number of randomly spaced critters known as Algebroids. But if a player's line or curve hits an on-screen obstacle (the Graph Gobbler), a committee randomly assigns a penalty of lost turns or clemency. $49.95.

Waterloo Microsystems Inc.
Waterloo, Ontario, Canada

Waterloo Logo. Full implementation of the Logo language including more than 140 primitives, procedures, twelve-digit decimal floating point arithmetic, iteration and recursion, input and output, printing of procedures and turtle's drawings, saving procedures and drawings in PC-DOS files, music painting, list processing, work space management, easy-to-use full screen editor, function-key support, additional infix operators, typeahead turtle graphics, friendly error messages, tutorial and reference manual, pocket-size reference card. $180.

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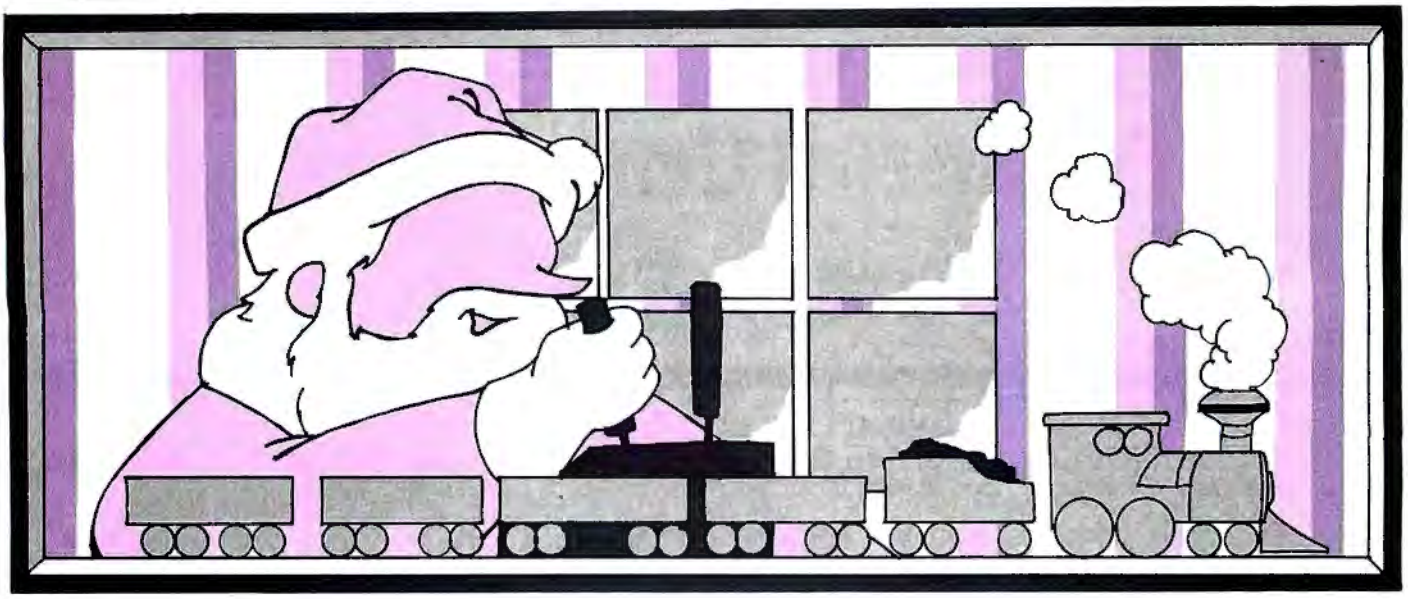

GAMES

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Longwood, FL

Arex. Enter and neutralize ninety percent of the aliens' territory while avoiding three types of alien ships. $34.95.

Aeon Concepts
Pittsburgh, PA

Microcosm. A strategy game that simulates birth, death, and migration among populations of microbes. In solitaire modes, explore the evolution of patterns at up to 2.5 generations per second. In competition modes, sabotage your opponent's colony while yours flourishes. Preview future generations, store patterns, change symbols or colors used, even change the rules for countless variations. $29.95.

AI Design
Santa Clara, CA

Roque. A pc adaptation of the most popular game running on the Unix system. Combine magic, weaponry, and determination to gain the Amulet of Yendor and escape the Dungeons of Doom. The action is fast and continuous, unlike simple text adventures. *Roque* is different every time you play, and its popularity lies in the fact that you succeed by building your character's skill, not memorizing events. The game requires 128K of memory, one disk drive, and runs on DOS 1.1 or DOS 2.0 with either monochrome or color monitor. $44.95.

Anthro-Digital, Inc.
Pittsfield, MA

Gambling Games. Gives you three hi-res color card games: five-card draw poker, blackjack, and keno. Also monochrome. $35.

Artificial Intelligence Research Group
Los Angeles, CA

Eliza. Created at MIT in 1966, *Eliza* is a nondirective psychotherapist who analyzes each statement as you type it in and then responds with her own comment or question—and her remarks are often amazingly appropriate! $45.

Avalon Hill Game Co.
Baltimore, MD

Computer Facts in Five. Computer game of knowledge with educational merit for the entire family. One, two, or more players participate, selecting from more than 1,000 popular and academic subjects. $26.

V.C. Short for Viet Cong, a game on the controversial Vietnam War. You have the task of bringing the civilian population under your protection. $25.

T.A.C. An acronym for Tactical Armor Command. You control individual tanks, antitank guns, and infantry squads. For one or two players, featuring hi-res graphics, enhanced sound, and stimulating challenge. Five different scenarios are available, from engagement to stalemate. $40.

Avant-Garde
Eugene, OR

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Federation. You, as commander of a Federation Starship, must protect your planet from Dronn Drones. Using your laser cannon, you destroy their flying ships while your neutrostatic bombs eliminate surface emplacements. To get to their mother ship you must first destroy their remote fighters, but beware of their tracking bombs. $29.95.

Lazermaze. In the twenty-fourth century, conflicts are settled in the hall of mirrors, and guess where the laser will exit? A correct guess results in the conflict being settled in your favor. Begin with thirty mirrors and work your way to seventy. $29.95.

Basic Business Software, Inc.
Las Vegas, NV

Super Trek. A real-time version of the popular *Star Trek* game. Supports an RGB monitor and displays four colors. $30.

Robert J. Brady Company
Bowie, MD

Lasercycle. A futuristic space-travel game in which players accelerate their powerful lasercycles through perilous arenas. The user wards off deadly, light-seeking attack spheres to complete the circuit and become a champion of champion riders. A game of maneuvers and countermaneuvers, played in sound. Allows players to progress from arena to arena, accumulate points, and advance in rank among the skill levels of the circuit riders. $29.95.

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Cortland Data Systems
Chicago, IL

The Insecticide. Blast creepy-crawly bugs as they slither down your screen. They want you and it's your mission to keep them from getting past you into your house. Watch out; if you hit one of their skeletons, it will be fatal. Fast action as you dodge fleas, ticks, and armies of bugdom. $34.95.

Star Defense. The Russians are launching a first strike against the earth from their bases in space. You must dodge meteors and attacking drones to bomb the missile sites. It is a fast-moving experience that is not for the faint of heart. If their missiles don't get you—their star fleet might! $29.95.

Datamost, Inc.
Chatsworth, CA

Market Mogul. With greed and prestige as motivation, your goal is to become chairman of the board of MegaCorp. To accomplish this, you play the stock market and attempt to become president of all MegaCorp subsidiaries. Stocks, current market price, last change in price, market value, outstanding loans, prime rates, percentage of equity are all here. $39.95.

Dynacomp, Inc.
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Space Lanes. A simple but exciting simulation of the economics of the space transportation industry. The object is to establish and expand space transportation companies in a competitive environment. The success of a particular company is measured by the extent of its space lanes. This success is reflected in the value of its stock. $14.95.

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Backgammon 2.0. Tests your backgammon skills and will also improve your game. A human can compete against the computer or against another human. $23.95.

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Prisoner 2. Enter "The Island" and play a game of delusion and paradox. A science-fiction adventure. $39.95.

Electronic Courseware Systems, Inc.
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Ear Challenger. An audiovisual game designed to increase tonal memory through a series of pitches that are played by the computer. The game includes several levels of difficulty based upon the number of pitches presented. Each pitch is reinforced visually with color presentation on the display screen. $39.95.

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Treasure Hunt. Roam the lifelike hallways, rooms, and chambers of a mansion in search of ten treasures. The game is nonviolent as you race against the clock to see how quickly you can find and collect the ten treasures. Color/graphics adapter. $24.95.

Chomps. You maneuver your *Chomps* around a maze, scoring points, avoiding monsters, and collecting prizes. Features four different mazes, joystick control, high score records. $29.95.

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Master Miner. Are you the Master Miner? If you think so, then prove it by mining more riches in the Asteroid Belt than your opponent. You can play alone or against another miner simultaneously. $39.95.

GameMaster
Evanston, IL

GameMaster. The fun-oriented computer network—housed in a 35-room electronic mansion in Evanston, Illinois—open to computer gamers who enjoy challenging interactive multiplayer games. Memberships: $15 introductory includes four hours on-line; full $50 includes 50-page system documentation plus ten hours on-line. At all times, on-line hourly rate, $3.

Generic Software
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Game-Pac-1. The Number-Rotation requires numbers hidden on the terminal screen to be found in sequence. Uses big block numbers and nine skill levels. Guns of the Alps is a shooting game for one to two players. The player must choose an artillery shell and shooting angle that will destroy the enemy gun. $29.95

I-Bert. An arcade-style game that requires a strange looking little fellow (called I-Bert) to constantly change the colors of the sacred tiles. However, evil critters make I-Bert's task more difficult.

Infocom, Inc.
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Planetfall. A humorous science fiction adventure set in the far future. You are the lowliest ensign aboard the Stellar Patrol Ship Feinstein. When your ship explodes, you are jettisoned onto a mysterious and deserted world plagued by floods, pestilence, and a mutant Wild Kingdom. You'll meet Floyd, a mischievous multipurpose robot with the mentality of an encyclopedia and the maturity of a nine year old. Together you and Floyd will unravel the mysteries of *Planetfall.* $49.95.

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Quotrix. A computer quotation game for two players. Given the author and letter positions, you solve a famous quotation on a word-by-word basis. If you incorrectly guess, you are given clues by one of three puzzle formats! *Quotrix* includes trivia questions, foreign word translations, crossword puzzles, and other word games. $34.95.

Mattel Electronics
Hawthorne, CA

Lock 'n' Chase. Maneuver your thief through the maze, picking up coins and other treasures. Billy-club-swinging cops are in hot pursuit, but you can temporarily escape them by locking gates behind you. The longer you survive, the more valuable the treasures become. One or two players. $17.50.

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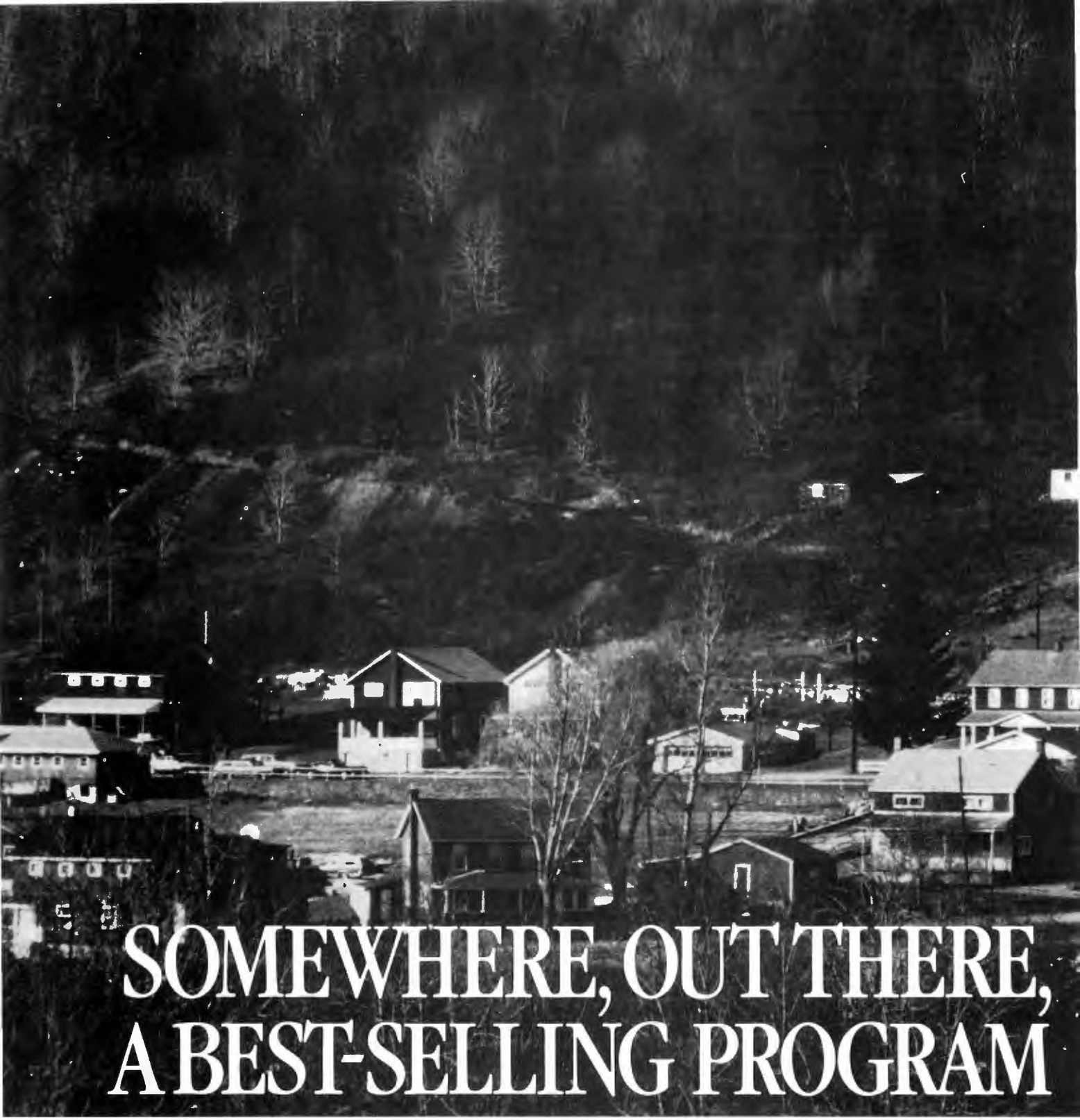
Nightstalker. The relentless robots have you on the run. Destroy one, and it's replaced by an even faster and smarter one. There's a bunker to hide in, but be careful. The spiders and bats can give a stunning sting to slow



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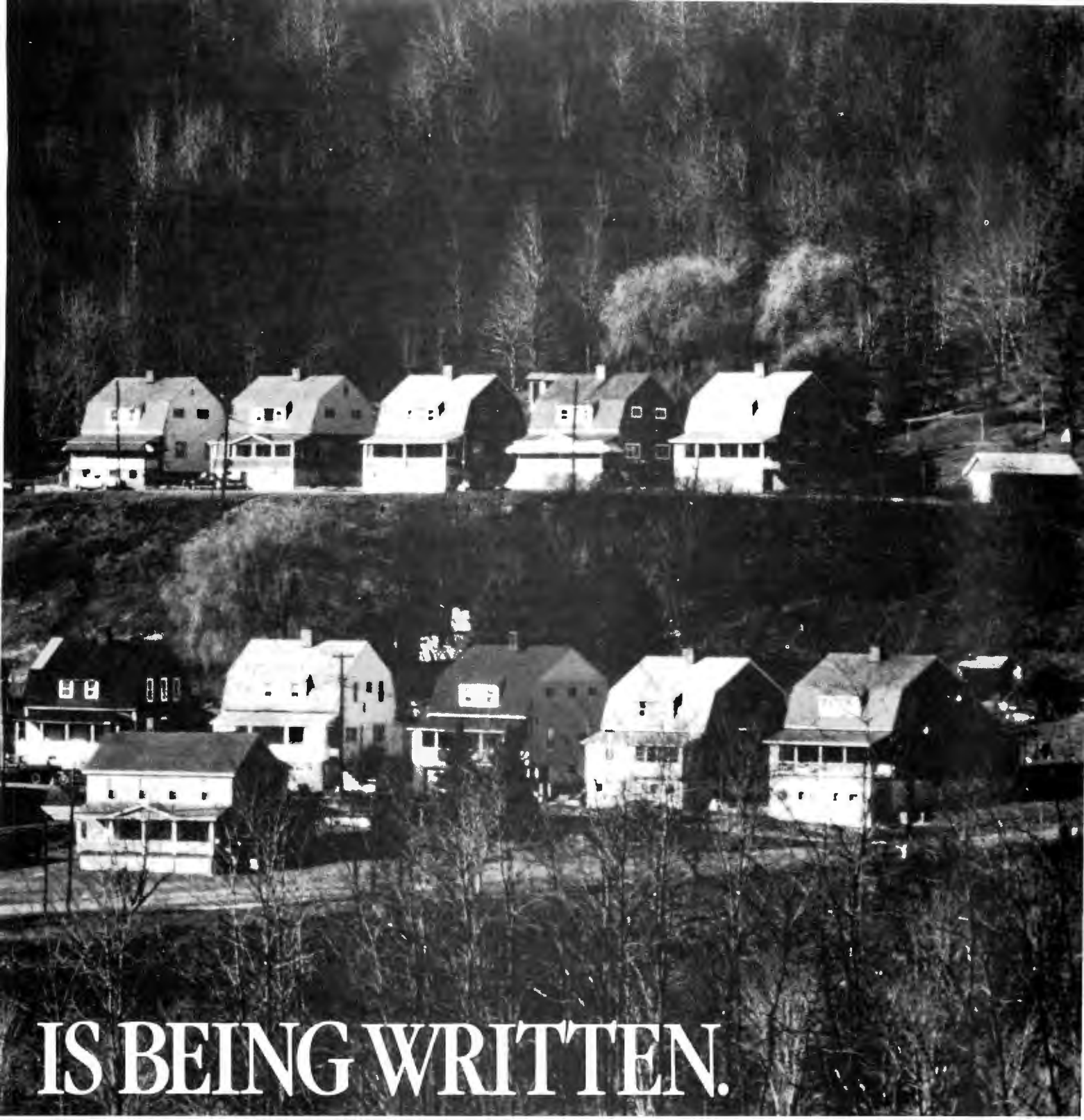

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Owl Plays Crossword and Chess. Turns your pc into an opponent for chess or for crossword games similar to Scrabble. Both games play in monochrome and color, have multiple skill levels, and need DOS, and 128K of memory. $39.95.

PC software of San Diego
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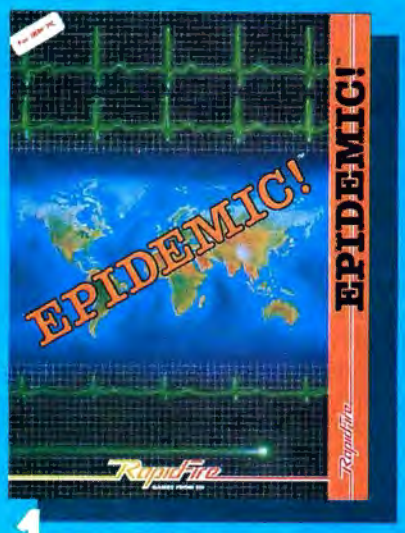

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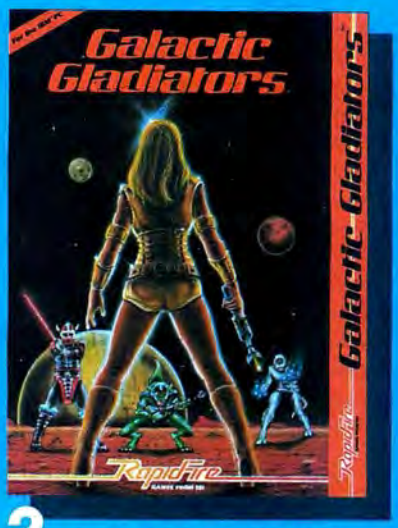

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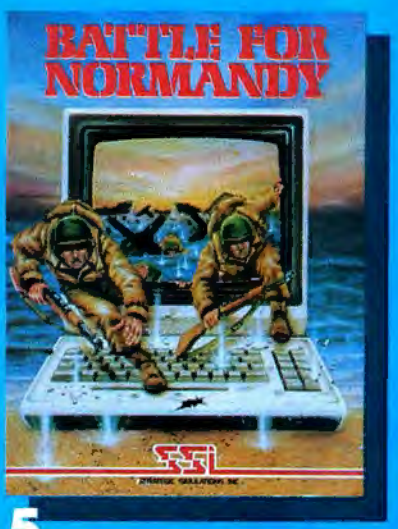

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Starside Engineering
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Clutter. An arcade action game for either the color/graphics or monochrome display adapter. Hit target ghosts with a continuously moving photon. The only way to steer the photon is by planting mirrors in its path—and the mirrors do not go away. $24.95.

Sydney Development Corp.
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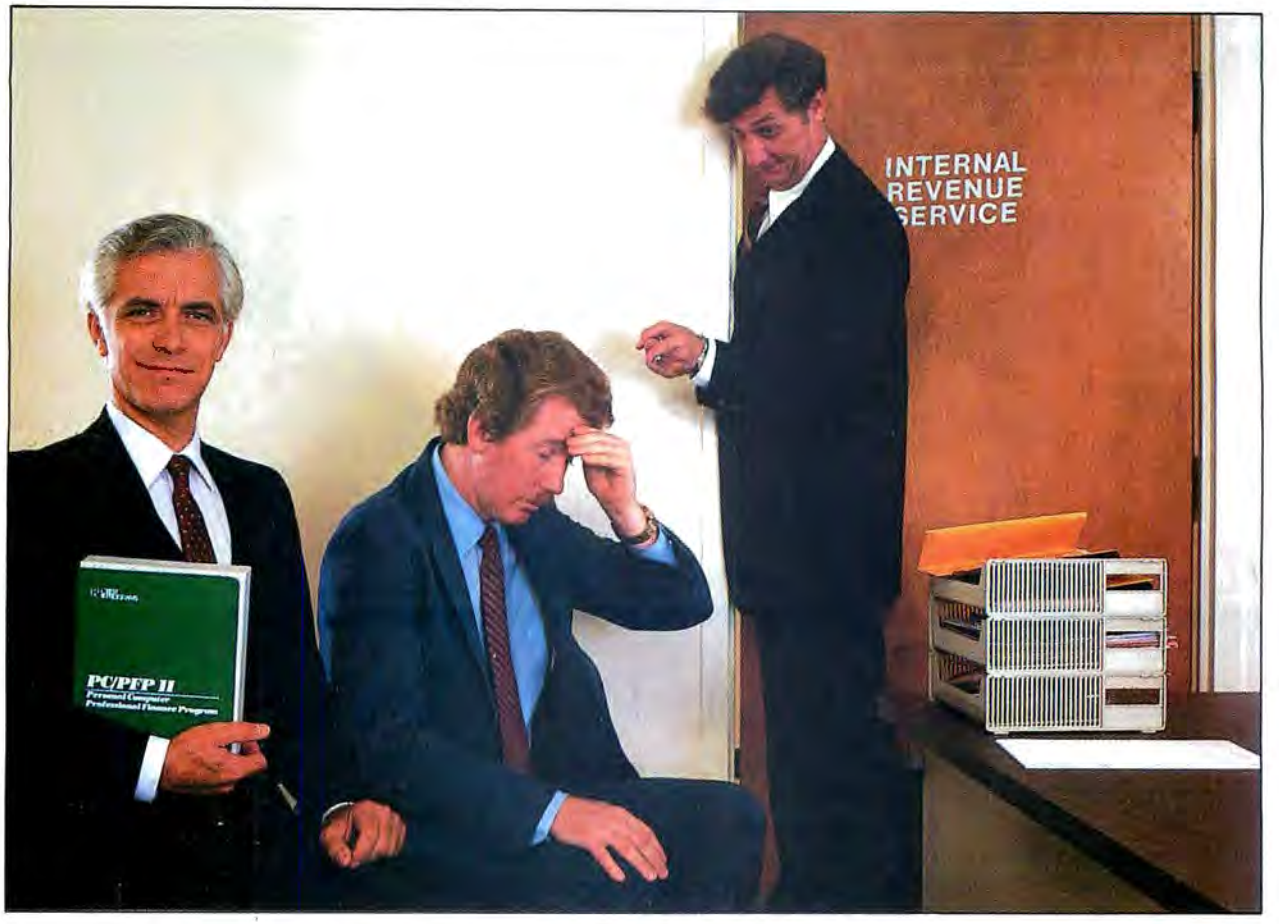

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Alpha Software Corp.
Burlington, MA

Type Faces. Offers the user fifteen different character fonts ranging from formal to friendly to conform to any printing situation. To increase the capability of the user's dot-matrix printer, the program provides typesetting capabilities to individuals who need to enhance business presentations or who want an inexpensive method of producing elegant reports or flyers. More than 100 symbols are available, ranging from Roman Complex, Italian Gothic, and English Gothic to special symbols and Greek lettering. $125.

Anidata, Inc.
Blackwood, NJ

Market Analysis. Fast, easy-to-use flexible technical analysis package. Graphs the basic technical studies in addition to user-specified formulas, and features split-screen charting. Retrieves updates automatically over the phone, and nine years of historical data is available through two databases. Also maintains portfolio records and includes a smart telecommunication system. $495.

Autodesk
Mill Valley, CA

AutoCad. A two-dimensional drafting and design system which runs on low-cost microcomputers, bringing the benefits of a high-performance drafting facility within the range of the smallest drawing office $1,000.

Axiom Corp.
San Fernando, CA

Four-Color Dot Printer. 80 CPS. Screen dump software and interface cable. $599.

BPS
Cambridge, MA

BPS Business Graphics. A complete business graphics package for the pc and XT. The program complements other application packages, such as *1-2-3*, *VisiCalc*, *Multiplan*, *SuperCalc* and *dBase II*, from which data can be extracted directly. *BPS Business Graphics* also allows users to develop full-color charts and graphs in standard formats, and to draw graphs on more than seventy printers and plotters. $350.

Robert J. Brady Co.
Bowie, MD

The Graphics Generator. Software graphics for business to access both *VisiCalc* and *SuperCalc*. Transforms both spreadsheets into full-color graphics. This version is also usable with a variety of printers and plotters. $95.

Chang Laboratories, Inc.
San Jose, CA

GraphPlan. An integrated spreadsheet and graphics package with statistical and sorting capabilities. Graph features include pie charts, bar graphs, time-series plots, horizontal bars, and scattergrams. Supports several popular matrix printers as well as HP plotters. $295.

Data*Easy Software
Foster City, CA

Project Management. Projects can now be visually displayed showing up to seven different tasks for as long as ninety-nine weeks. Setting up a progress chart is as easy as filling in the blanks. $35.

Bar Graph Generator. This utility program allows you to create bar graphs that display statistical information. Without programming. The color/graphics board is not required. $35.

Desktop Computer Software, Inc.
Santa Cruz, CA

Graph 'n' Calc. Decision support-graphics system that links a spreadsheet and graphics package together. Single-key commands. You can develop forecast models and analyze statistical and financial data. A variety of different charts and graphs. $199.

Enertronics Research, Inc.
St. Louis, MO

Energraphics. A complete graphics program including business graphics (pie, bar, and line charts) statistics, surface drawing and contouring, symbol design, 2-D CAD (scaling, overlay, symbol interaction) and 3-D object CAD (scaling, zooming, rotation, and hidden line). Will interface to many popular spreadsheets. Printer or plotter output is available. $250.

Ensign Software
Boise, ID

Character Generator. With this tool you can define the shapes of the graphic-character cells for the ASCII codes 128 to 255. The work tablet consists of three rows of eight enlarged cells per row. This multicell grouping makes it easy to design larger shapes. Color/graphics adapter. $24.95.

Color Demonstration. A collection of ten color-graphics demonstrations. All are accessed from the menu with the function keys. Includes kaleidoscope, weave, ensign logo,

GRAPHICS

portrait, stars, prism, string art, 3-D hills, script, calendar. Color/graphics adapter. $24.95.

HP 7470 Plotter Demo. Ten demonstration programs for use with a HP 7470 or HP 7225 plotter. The programs can be modified to serve your particular needs. Includes digitizer, phone chart, 12-month trend, birthday plot, archimedes spiral. $24.95.

E & S Software
Bedford, MA

ES Painter. An easy-to-use drawing and coloring program for children. Uses only the function keys and joystick. Comes with ES Picture 1, a disk containing nine predrawn pictures. $45.

Fox & Geller, Inc.
Elmwood Park, NJ

Quickcode. An application generator for Ashton-Tate's *dBase II.* Uses simple screen forms to create an application, store and retrieve data, print forms, do word processing, and perform a variety of other functions. $295.

dGraph. A graphics system that can be used to get presentation-quality pie, bar, line, and piebar charts. Includes an easy-to-use data entry procedure and the ability to perform very powerful analyses of databases created by Ashton-Tate's *dBase II.* Can be combined with programs written in Basic, Pascal, and PL/I. $295.

Quickscreen. A program generator which lets the user "paint" a form on his CRT and then generate programs to display the form for data entry or print the form. There are three versions; each generates program in a different language: C, Basic, Microsoft Basic, and DJR Associates's FMS-80. $149.

Frontier Technologies Corp.
Milwaukee, WI

Business Graphics Board. This board provides 640 x 480 x 4 resolution and uses the NEC 7220 graphics controller. A proprietary design allows for four planes of 640 x 480 with only half the memory. Compatible software and emulation of 40XX- and 3279-type terminals. $695.

Intelligent High Resolution Graphics Board. This board provides 1024 x 1024 x 4 resolution and uses a NEC 7220 and a local 8088 CPU. Built-in primitives provide easy software control. The emulation of 40XX and 3279 is also possible. A maximum of sixteen colors can be displayed at once. The colors can be chosen from the 4096 color look-up table option. $995.

Graphpac. Provides various routines for bar charts, pie charts, etc. that can be used by application software packages such as Lotus *1-2-3* and business graphics. Also makes provisions for CPM-GSX interfaces as well as GKS and CORE routines. The software is meant for implementation on the Frontier Technologies Intelligent High Resolution Graphics board but could be modified for other hardware by use of suitable drivers. $195.

Graphic Communications, Inc.
Waltham, MA

Graphwriter. A business-graphics package designed for people who want to use a microcomputer to prepare formal presentations. All chart types are illustrated in a formal selection guide and designed for use by untrained personnel. Output is on plotters. Screen preview is optional. Basic set, $395. Extension set, $395. Both, $590.

Hewlett-Packard Co.
Palo Alto, CA

HP 7470 Graphics Plotter. Provides for automatic pen changing for two color or two line widths. Can be used for generating paper plots and overhead transparencies in 8 1/2 x 11-in size. Supported on most of the leading graphics software packages. Five character sets. $1,095.

HP 7475. Six-pen plotter provides for automatic pen changing in up to six colors or two line widths. Can be used for generating paper plots in sizes 8 1/2 x 11-in and 11 x 17-in and for overhead transparencies. Supported on most of the leading graphics software packages. Nineteen character sets. $1,895.

Innovative Software, Inc.
Overland Park, KS

Fast Graphs. Graphics/plotter program that creates bar charts, point or line graphs, and pie charts either directly or from data in popular spread sheets, T.I.M., Fast Facts. Complete draw and edit capabilities allow you to design any new screen or saved graph. $295.

International Software Alliance
Santa Barbara, CA

Caligraph. Creates pie charts, line graphs, bar graphs, and histograms. You define x and y axis labels (or pie segments) and then enter x and y values. Data are scaled as necessary prior to printing graph. You can then either save the graph to disk or call up *Image* (Screen Dump Utility) to print graph to your Epson MX/100 or C. Itoh printer. *Caligraph,* $59. *Image,* $35. Both, $75.

Micro Control Systems, Inc.
Vernon, CT

3-D Digitizing Tablet. Four-axis space tablet

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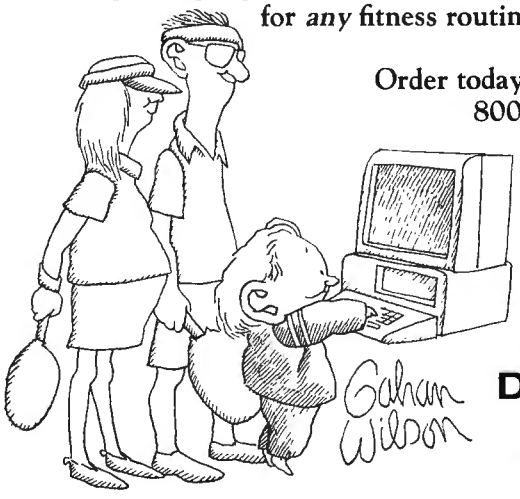

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GRAPHICS

with space graphics software, $795. Four-axis space tablet with advanced space graphics software, $1,695. MCS high-resolution A/D interface card, $750.

Micrografx
Richardson, TX

PC-Draw. An interactive drawing system. Virtually any type of drawing can be created, maintained, printed, or plotted on with *PC-Draw* because the user can create his own symbol libraries. Supports a light pen and/or keyboard for user interaction. Graphic functions (rotation, scaling, and so on) are provided. *PC-Draw*, $250. Plotter support, $50.

MNC Software Sales
Minneapolis, MN

Imagedit. A profession-tailored color-graphics system. Terms, shapes, symbols of your profession are preloaded into replaceable character generator on color CRT adapter board. Design or layout products or plans using familiar language. Edit and print hard copy documentation from *Imagedit*. Images easily transferred to other programs. $350.

Mosaic Software, Inc. (formerly Graphic Software, Inc.)
Cambridge, MA

Softplot/BGL. First device-independent graphics library for Microsoft Basic on pc (MS-DOS) and CP/M systems. Brings the power of sophisticated graphics subroutine packages to Basic. Supports advanced two-dimensional viewing with windows, two-dimensional rotation, and three-dimensional perspective plotting. Emuplot feature allows printing of high-resolution graphics on printers without graphics-display hardware. $200.

Non-Linear Products
Minneapolis, MN

Plot. A program for plotting and processing data and curves. Instructions on how to use the program are given on the screen, with different options selected by the function keys. No information about minimum and maximum values, ticks, or scales is required. Created graphs may be printed or stored on disks. $29.95.

Norfork Systems
Laurel Springs, NJ

Comp-Art. Easy use of function keys enables you to draw pictures, shapes, and designs. Automatically generates and saves the *Basic* code to be used later. Requires two disk drives and color/graphics adapter. $59.95.

Number Nine Computer Engineering, Inc.
West Hartford, CT

Graphics Board. 2048 by 2048 resolution. 256 of more than 16 million colors displayable at 512 by 512 pixels. High-speed image generation. I/O includes graphics tablet, camera digitizer, hand controllers, printers, plotters, film, and tape recorders. RGB, composite color/B&W, RS-170A genlock. Interpreter, Basic, Pascal, professional application software available. From $1,145.

PCsoftware of San Diego
San Diego, CA

PCcrayon. Is there an artist lurking inside you, just waiting for the chance to create slide shows, animated displays, and colorful graphics? *PCcrayon*'s commands are quickly learned and easy to use. $44.95.

The Executive Picture Show. Creates free-form or business graphics displays for hard copy, slides, and computer presentations. Allows animated presentations that run for hours displaying hundreds of screens and graphs using just one data disk. Screens from other programs can be included in presentations. Utility included allows capture and storage of these screens. Requires color/graphics adapter, 128K, two disk drives or hard disk. $195.

Plantronics, PC+ Enhanced Graphics
Milpitas, CA

Statmap. Generates maps of counties, states, Zip Codes, federal regions, and census tracts in the United States. Supports most popular plotters and printers, and is compatible with DIF spreadsheet files. Four colors with the Colorplus Graphics Board. $999.

Wall Street Window. Portfolio management and technical analysis. Up to twelve months hi-lo-close and volume data displayed as daily-weekly-monthly screen. Averaging, trendlines, profit-loss, spreadsheet, and reporter interface. $395.

Colormagic. Enter the world of art through video graphics. Uses sixteen colors in medium resolution and a keyboard, joystick, or drawing tablet. $149.

Hypergraphics. Combines color, graphics, and animation to create standalone tutorials and executive presentations using sixteen colors in medium resolution and four colors in high resolution. Operates exclusively with the Colorplus Graphics Board. $495.

RGB Display Corp.
Grass Valley, CA

RGB-1400. Features 700 lines resolution, super high contrast/nonglare, 32 colors selected from 4,096 selectable color sets, front access calibration/control, test signal performance verification, RGB-Digital/Analog, and compact cabinet design. $595.

Savant Corp.
Houston, TX

Graphics Utility. Draws color pictures on your computer screen. Create character sets and shapes for your own programs. Shapes may be combined into larger pictures, stored on disk, and are compatible with Basic graphics statements. Makes copies of the shapes on an Epson printer. Requires color/graphics card. $85.

SofTech Microsystems
San Diego, CA

Turtlegraphics. A machine-independent, adaptable set of library subroutines that produces portable, high-resolution, monochrome or color graphics. UCSD Pascal, Fortran-77, and Basic can be used to create graphics software for use on any microcomputer that runs on the p-System. Turtlegraphics is included in the p-System bootable system. $75.

Software Labs
Sunnyvale, CA

Graphics Utilities. Efficient assembly language routines for PC-DOS Pascal/Fortran, Lattice C, or Pascal/MT+ programs. Supports Siggraph core's setwindow, setviewport, and clipping, drawing circle/ellipse/pie/line, graphics store/retrieve, animation controlling light pen/joystick/mouse. 110-page manual. $69.

Slide Master. A user-friendly menu-driven slide editor. You may create/edit/combine/archive/retrieve pie, bar, line, and text (normal, roman, smooth, and slant fronts) charts. You can create/digitize your logos/fonts. It displays on the screen, printers, and HP Plotters. $149.

Software Publishing Corp.

PFS:Graph. A graphics package that can work alone or use data from *PFS:File* or *VisiCalc* files to produce bar, line, or pie charts of presentation quality in minutes. Line and bar graphs can be mixed and matched, and up to four graphs can be displayed on a single set of axes. $140.

Spies Laboratories
Hawthorne, CA

NicePrint. Program upgrades the IBM/Epson dot-matrix printers to near daisy wheel print quality. Works with *WordStar* and many other programs. Very easy to use—user needs to read only the first page of the manual to get started. Includes six font styles: roman, letter gothic, orator large, script, olde English, and computer. $95.

Starside Engineering
Rochester, NY

Gylphix. An interactive graphics scratch pad

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allowing fast development of graphics images on-screen. Draw freehand or create boxes, circles, and shape tables. Mix text with graphics, and use large "fancy" fonts in four sizes. Includes its own RAM disk. $49.95.
Difmaster. A graphics generator for use with Data Interchange Files created by *VisiCalc* or with an included edit utility. Creates three kinds of graphs: 3-D vertical bar charts, 2-D bar charts, and scatter charts with linear regression. $79.95.
Frieze. A graphics store/dump utility that takes graphics images from the screen and either stores them as disk files or prints them to paper. Supports the Plantronics, Hercules, and Tecmar graphics cards, and prints to the IBM/Epson, IDS, NEC, and Okidata printers and the Prowriter. Prints in color to Prism. $55.
Fontmaster. A character font editor for the 128 user-defined characters available on the color/graphics adapter. Rotate, invert, reverse the video, create new characters from scratch. Explains how to use custom fonts in your programs. Includes several sample custom fonts. $39.95.

Summagraphics Corp.
Fairfield, CT
The SummaMouse. Low-cost digital mouse for menu selection, graphics, and text editing. Based on solid-state optical technology, the mouse offers up to 100 lines of resolution per inch. Available with either an RS-232 or TTL serial interface (built into the mouse itself) and is compatible with all new Summagraphics product lines. $310, including RS-232 interface.
The MM Series. Low-cost digitizing tablets designed to perform all cursor steering, menu picking, and graphics tasks, with the added flexibility of a mouse. Three sizes of tilt-adjustable tablets with either an RS-232 or TTL serial interface. *MM961* (6 x 9-in), $395. *MM1201* (12 x 12-in), $500. *MM1520* (15 x 20-in), $1300.

T & W Systems, Inc.
Huntington Beach, CA
Cadapple/Versacad. For computer-aided drafting (CAD). $1,995.
VersaCAD. For computer-aided drafting. $1,995.

Tecmar, Inc.
Solon, OH
The Graphics Master. A highly flexible video board that emulates both the IBM monochrome board and color/graphics board. Supports super-high horizontal and vertical resolution in graphics modes (640 x 400 on standard monitors) and allows hi-res graphics (720 x 700) on IBM monochrome. $695.

United Software of America
New York, NY
3-D Graphics. Create animated 3-D color images in true perspective with full rotational ability. A powerful screen-oriented text editor is included to facilitate image formation. $69.95.
3-D Supergraphics. Draws 3-D color graphics so quickly that animated displays are possible. The program is completely compatible with integer Basic languages, DOS, and assembly-language programs. $39.95.

Versa Computing, Inc.
Newbury Park, CA
IBM Versawriter. A digitizer drawing board and software system that allows quick entry of graphics to the pc 320 x 200 and 640 x 200 screens. Drawing board accepts original drawings of up to 8 1/2 x 12-in. Plugs directly into the paddle game adapter's connector and does not require additional slot space. $299.
Graphics Hardcopy System. Reproduces IBM screen graphics on the IBM dot-matrix printer. Includes full or 1/4-size printout, reverse or normal inking, density and offset control, and slide show of IBM graphics capabilities. $24.95.

Visual Horizons
Rochester, NY
Computer Slide Express. Will turn a pc into an art-generating machine. Computerized charts, designs, graphs, and graphics sent to Computer Slide Express are converted into 35 mm color slides and returned by mail. Enlargements, black and white or color prints and overhead transparencies are also available. $6.00 per slide.

West Coast Consultants
Tracy, CA
Curve Perspective. A CAD/CAM graphics program designed for use with most plotters. The program plots any 3-D object(s) with or without hidden lines removed. Up to 500 line elements, circles, arcs, etc. may be used. The program translates, rotates, and scales the image on-screen in either perspective or orthographic projection. $450.
Curve Three-D. Plots three-dimensional hardcopy graphics of user data, space curves, and mathematical functions of the form Y = F(X,Z) to a variety of plotters. Full 360 degree rotation of the surface with hidden-line algorithm, tic marks, and scale numbers. $199. With CRT option, $250.
Curvefit. Performs up to four mathematical fits to x, y data that allows you to replace the data with either a straight line, polynomial (up to degree 9), exponential, or power law equation. Goodness-of-fit parameters are displayed along with equation coefficients. Plots of the fits and "residuals" may be directed to any of several plotters. $99.50.
Curve II. A combined business and scientific graphics package designed for use with several popular plotters. The program is menu-driven and includes 26 *Basic* subroutines for highly customized output. Plots Cartesian, parametric, and polar equations; bar, pie, and line charts in both linear and log space with flexible labeling. $275.

HARDWARE

Advanced Systems Concepts, Inc.
Pasadena, CA
Parallel and RS-232C Data Switches. For electronic or manual switching of computers or peripherals. Allows remote operation, computer back-up, multiport addressing, expanding, or printer sharing. Staff available for configuring peripheral networks. 24-hour ASCII Express Service available. $60-$200 per port.

Applied Creative Technology, Inc.
Arlington, TX
64K Printer Optimizer. A 64K to 256K spooler, with space compression for more efficient memory usage. Capabilities include being able to adapt mismatched equipment of various brands; filter, translate, modify, merge or delete data, plus provide for remote control of all printer functions. Options include serial/parallel conversion, protocol

HARDWARE

conversion, and connection of up to three printers with automatic or manual switching between them. 64K parallel model, $499.
ETI Squared IBM Electronic Typewriter Intelligent Interface. Converts an IBM Electronic Typewriter Model 50, 60, 65, 75, or 85 into a letter-quality printer. Includes a built-in 2,000 character spooler, access to all typewriter features, and typesetting capability. Use and maintenance of the typewriter is not impaired. 2K parallel model, $495.
Type & Print Low Cost Typewriter Interface. Converts the Olivetti Praxis Model 30, 35, or 40 portable electronic typewriter into a low-cost combination computer printer and typewriter. Equipped with a standard parallel connection compatible with most personal computers. Installation into the typewriter involves one simple plug-in connection.

AST Research, Inc.
Irvine, CA
CC-232 Advanced Communications Card. Features a programmable Zilog serial I/O processor with two RS-232 ports that support async, bisync, SDLC/HDLC communications protocols, user-selectable DTE or DCE interfacing, and programmable baud rates from 50bps to 19.2bps. Intended for use by the customer designing his own communications software. $295.
MegaPlusII. An IBM-compatible multifunction card that features memory expansion capabilities of 64K to 512K of parity-checked memory, up to two RS-232 asynchronous serial ports, one parallel printer port, a clock calendar with battery back-up, and an optional game adapter port. $395 to $1,240.
I/O-PlusII. Allows input/output expansion capabilities of up to two RS-232 asynchronous serial ports, one IBM-compatible parallel printer port, one optional game adapter port, and a clock calendar with battery back-up. $165 to $315.
ComboPlus. Features expansion capabilities of 64K to 256K of parity-checked memory, one RS-232 asynchronous serial port, one IBM-compatible parallel printer port, and a clock calendar with battery back-up. $395 to $695.
SixPakPlus. A multifunction card designed specifically for the second-generation pc and XT. Offers 64K to 384K of expandable memory, one RS-232 serial port, one IBM compatible parallel printer port, a clock calendar with battery back-up, and an optional game adapter port. $395 to $945.

Atron Corp.
Saratoga, CA
The pc Probe. A hardware/software debugger for use when developing. It consists of a printed circuit card and software on disk that plug into the pc. Provides real-time trace, hardware real-time breakpoint, symbolic debugging, memory protection, and high-level hardware support. $18.95.

ATV Research, Inc.
Dakota City, NE
Diamond TV Camera. Great low-cost TV camera for use with A/D converters used in conjunction with computers. Complete with lens. $135.90.
Pixe-Plexer. An IC-type modulator kit (audio and video) tuneable from channels 2 to 9. Assembly time is about two to three hours. Requires 15V at 50ma. This is a module kit and does not contain case, power supply, or input/output connectors. $24.50.
Apple-Verter. High VHF band, high-fidelity RF module for Apple II, II+, IIe, and Apple compatible systems. Color and monochrome displays on regular TV sets on channels 7 to 10 (tuneable). Plugs directly into computer. Complete with connecting antenna cable. $32.

Axiom Corp.
San Fernando, CA
Printer Buffer. 32K standalone buffer. Serial or parallel version available. $299.

Back Bay Micro
Burlington, MA
Tri-Pack. Purchase all the peripherals needed for the pc at a significant savings. The Tri-Pack contains a printer port, asynch serial port, and battery backup real-time clock. The printer and asynch are switchable as one or two. Accepts IBM software. $150.

BC Systems, Inc.
La Grange Park, IL
BC-20. A 20-megabyte, removable disk subsystem consisting of two 10-megabyte cartridge drives, giving you infinite virtual storage. Network available. List $4,950.

Black Box Corp.
Pittsburgh, PA
Personal Computer Printer Adapter Cables. Designed to allow users to connect Centronics-type printers to the DB25 parallel IBM connector. Cable comes with one DB25 and one Centronics-style connector. It does not adapt serial data to parallel. $23 plus .69/ft.

Byad, Inc.
Arlington Heights, IL
DS Series Z-80 Boards. Run CP/M application software on pc. Boards include 64K RAM and CP/M 80 (version 2.2) operating system. DS2 also includes asynch communications port. DS1, $660; DS2, $760.

Consolink Corp.
Longmont, CO
SooperSpooler and *MicroSpooler.* Standalone hardware print buffers with their own internal power supply. Compatible with either Centronics or RS-232C serial interfacing, they are also capable of interface conversion. Standard features include digital status readout, pause function, reset function, protocol conversion, and variable baud rates. Both products are covered by a one-year limited warranty. Prices start at $219.

Control Technology, Inc.
Oklahoma City, OK
Model RBS-AC. Reserve power supplies prevent loss of data and equipment damage from power outages and adverse power-line conditions by providing battery back-up and line conditioning for all hardware connected to them. Available in 300VA & 500VA versions at $569 and $695 respectively.

Corona Data Systems, Inc.
Westlake Village, CA
Corona Personal Hard Disk. A professional quality 10M Winchester disk drive subsystem (internal and external versions). Software compatible with MS-DOS 1.25, PC-DOS 1.1, and p-System (available through NCI). Special features: RAM disk, automatic error correction, and easy backup utilities. $2,695; $2,295, internal version.
Corona PC Desktop Computer. A professional quality desktop personal computer with standard 128K, 320K floppy, 12" high-resolution monitor, four expansion slots, and serial and parallel ports. Standard software includes MS-DOS, GWBasic, *Multimate*, and *PC Tutor.* Optional memory to 512K and second floppy or 10Mb hard disk. Many software utilities including ultrafast RAM disk. $2,595-$5,320.
Corona PC Portable Computer. A professional quality portable personal computer with standard 128K, 320K floppy, 9" high-resolution monitor, four expansion slots, and serial and parallel ports. Standard software includes MS-DOS, GWBasic, *Multimate*, and *PC Tutor.* Optional memory to 512K and second floppy. Many software utilities including ultra-fast RAM disk. $2,545-$3,820.

Cuesta Systems, Inc.
San Luis Obispo, CA
Datasaver. AC power backup unit, 200 W. Provides reliable power for pc and XT. Prevents data loss because of voltage drops or transients, AC line conditioning, internal battery for 5 to 15 minute holdup, audible/visual/electronic alarms, auxiliary battery jacks for extended time or portability. Compact, desk-top styling. $695. Foreign power, $730.

Data Encore (Subsidiary of Verbatim Corp.)
Sunnyvale, CA
The Data Life Disk Drive Analyzer. The 5 1/4-in minidisk is a diagnostic tool that will

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HARDWARE

check the performance of disk drives in the pc and XT and some compatible systems. The user-friendly software runs four comprehensive tests to check head alignment, disk clamping, write/read accuracy, and disk speed. It then displays a read-out with evaluations and indicates areas needing adjustment and/or repair. $39.95.

Data Terminals & Communications
Campbell, CA

Style Writer. Parallel, complete word processing and graphics, wide variety of daisy-print styles, memory stores up to twenty pages, prints more than 130 words per minute, automatic proportional spacing and underscore, variable pitch and lines per inch, red and black printing, shadow print, subscript/superscript, bidirectional printing. Optional sheet feeder and forms tractor. $899.

DTC 380Z. For the personal and business computer market. Has 48K buffer and software compatibility with Diablo 1640/1650/630. Daisy-wheel printer prints at thirty-two CPS, bidirectional. Sheet feeder and forms tractor options. $1,495.

Davong Systems, Inc.
Sunnyvale, CA

Multilink. Local-area network that allows microcomputers to access hard disks attached to specified computers defined as file servers. Although the local file server can operate as a standalone, other network users at remote computers can access the file server's hard-disk storage, subject to specified control and security. Three pcs including 10M hard-disk system. $4,595.

Tape Backup System. Streaming tape backup drive copies from a Davong Universal Winchester hard-disk system or floppy onto 1/4" tape cassettes. Three cassette copies can be stored at another location. The tape has a formatted capacity of eighteen megabytes. Fifteen megabytes can be backed up in about four minutes. Davong Hard Disk, $1,795. Universal Hard Disk, $1,995.

Hard Disk System. Universal Winchester hard-disk system. Single-drive systems are available in 5-, 10-, 15-, 21-, and 32-megabyte (formatted) capacities. Up to three slave drives can be added in any capacity to provide up to 128 megabytes of on-line data storage. Starting at $1,845.

Daystar Systems, Inc.
Dallas, TX

Ultra55. Five-function board has memory up to 384K using 64K DRAMS or up to 1.5M using 256K DRAMS, two RS-232 asynchronous serial, and one parallel printer port. All three channels have keyboard-selectable addressing, clock-calendar with battery backup. 256K version, $595.

Dresselhaus Computer Products
Glendora, CA

Finger Print. A convenient add-on for Epson or IBM printers that puts control of print modes at your fingertips. Condense, emphasize, or even skip perforations by simply tapping the control-panel buttons. Does not interface with normal printer functions. This plug-in module installs easily without soldering, comes with a reference label, and one-year warranty. $59.95.

Frontier Technologies Corp.
Milwaukee, WI

Multifunction Memory Board. Will provide a maximum of 256K of additional memory per board. Options include a printer port, serial port, and a real-time clock. $245.

IEEE-488 Controller. Interfaces your pc to frequency generators, digital multimeters, power supplies, disk drives, speech synthesizers, and most other IEEE-compatible equipment. Options include RS-232 serial port, real-time clock/calendar with battery back-up, and an EPROM/PROM programmer. $395.

Giltronix, Inc.
Palo Alto, CA

5500 Series Parallel Selecto-Switch. Allows port expansion and device sharing. Available with one I/O port and two or three communications ports. Switches lines 1 through 24. All ports have female D-25 type connectors. $159 to $199.

GM Enterprise, Inc.
Roselle, IL

ParlePC. Plugs into any available input/output slot and operates under the control of user-provided software. Lets the pc interface with the real world and has unlimited vocabulary speech output for a variety of applications in office automation systems, business, education, entertainment, etc. It has an on-board audio amplifier, a speaker, and a jack for an external speaker. $199.

Parle PC Programmable, General Purpose, Parallel Input/Output Adapter. Plugs directly into any available input/output slot inside the computer and operates under the control of user-provided software. Twenty-four general-purpose, TTL compatible I/O lines; programmable I/O configurations; complete handshaking protocols; bidirectional bus mode; and single-bit set/reset capability. This adapter supports interrupt and/or software poll environments. $149.

Harvard Associates, Inc.
Somerville, MA

A small, programmable robot that moves, turns, draws, blinks, beeps its horn, and feels its surroundings with its touch sensors. An optional speech board permits it to talk—with a vocabulary of more than 300 words. Available in both serial and parallel interface models. $999.95.

Hayes Products
San Marcos, CA

Mach II. Joystick provides perfect arm alignment with 360° of movement, has fine-trim adjustment for each axis, incorporates a self-centering feature than can be externally disengaged, and is constructed with precision, long-life components. $44.95.

Mach III. Joystick provides the same features as the Mach II plus features never before available in an analog joystick. Added features include a push-button switch on the stick handle and a stainless-steel ball as its main pivot for greater comfort, precision, and durability. $54.95.

Hercules Computer Technology
Berkeley, CA

Hercules Graphic Card. A circuit board that allows graphics on IBM monochrome display. $499.

IDE Associates, Inc.
Bedford, MA

IDEAdisk. Uses the 3.9-inch drive. This hard disk drive has a 5.3M (formatted) removable cartridge, and can be internally or externally mounted. The external version can be equipped with one or two disks. Both versions come complete with a disk drive and cartridge, controller boards, SASI interface card, the required mounting hardware and cables, support software, installation manual, and one-year warranty. Internal Mount Version, $1,795. Second disk drive for external mount, $1,050

IDEAplus. Available with up to 256K of RAM parity checked memory plus any or all of the following functions: parallel interface, serial interface, and clock/calendar/battery. The parallel port can be configured as a Winchester disk drive interface, or as a printer interface. An RS-232C cable adapter with DB25 is included with every serial option. $329 to $529.

IDEA Memory Card. Available with 64K to 256K of on-board memory, in 64K increments. Has full parity checking and generation, and meets or betters all IBM specifications. $239 to $449.

Interactive Structures, Inc.
Bala Cynwyd, PA

ShuffleBuffer. Serves all major serial and parallel computers and all major serial and parallel printers. Prints files from different software together. *ShuffleBuffer* prints what you have requested and the computer is free to do other tasks. 32K, $299. 64K, $349. 128K, $445.

HARDWARE

Kraft Systems Co.
Vista, CA

Paddle Pairs. Feature an optimum 185° knob rotation for faster operator response and higher scores. Contain custom potentiometers designed specifically for the pc, thereby assuring the highest resolution and accuracy with no "hop." $49.95.

Precision Joystick. Features "spring-centering" and "free-floating" stick modes selectable by switching external toggle switches on the bottom of the case, trim controls on each axis, and a full one-year warranty. It offers great versatility for both business and game applications. $69.95.

LNW Computers
Tustin, CA

RAMless Busboard. Offer the same I/O expansion capability as the Busboard with the exception of no RAM or RAM expansion and no coprocessor slot. Comes complete with both the *Spoolbus* and *Busdrive* software. $129.95.

Z-80A CP/M Coprocessor Module. The high-performance Z-80A microprocessor on the CP/M module is fully compatible with the programs designed to run on the CP/M 2.2 operating system and features disk compatibility with many CP/M personal computers including the LNW80 Model 2, the Kaypro 2, and the Xerox 820. $249.95.

Five-Inch/Eight-inch Floppy Disk Controller. This module replaces the disk controller in the pc to provide both the interface for 5-in disk drives as well as the interface for external 8-in disk drives. Supports both single- and double-sided disk drives in both single- and double-density formats. Can be used by the CP/M module to provide 8-in compatibility in CP/M. $169.95.

Asynchronous Communications Module. Can be programmed as the standard IBM Com 1 or Com 2 or can be set to one of thirteen additional unique addresses to allow each Busboard to contain up to eight separate serial asynchronous channels with a total of fifteen different channels per pc. $79.95.

Parallel Printer Module. Standard IBM parallel printer interface can be set for Line Printer 1 or Line Printer 2 port addressing. Can also be set for an optional Line Printer 3. May also be used as a simple general-purpose eight-bit I/O port. $49.95.

Clock Calendar Module. Crystal-controlled clock/calendar with battery backup. In addition to the on-screen time display feature, the software also includes a complete alarm function to allow automatic execution of programs when set time has occurred. $69.95.

Auto-Answer Auto-Dial 300 Baud Direct-Connect Modem Module. This modem features autoanswer and autodial with both tone and rotary dialing. The Basic program supplied allows for a smart modem and a speed dialer. Interfaces directly with the async busmodule. $149.95.

Eight Bit I/O Module. This module provides for a latched eight bits of output and an optionally latched eight bits of input. Port addressing is user programmable for up to eight modules per busboard. Interrupts are supported for each module with software programmable interrupt control on each module. $59.95.

Micro Design International, Inc.
Maitland, FL

Insider. A very fast and rugged hard disk system that is completely contained inside the pc. 10M Winchester disk system, $995.

Micro Disk, Inc.
Gardnerville, NJ

Hard Disks. For pc and pc-compatibles, ranging from six to seventy-two megabytes. Local area networking, CPM/80, CPM/86, Basic Four, BBII, UCSD p-System, and MS-DOS are supported. $2,200 to $7,200.

The Genius. Full-page display provides hardware features, user benefits and system performance equal to that of dedicated word processing equipment. $1,795.

1-DOS Operating Systems. Hard disks ranging from six to seventy-two megabytes, local area networking, CPM-80, CPM-86, Basic Four BBII, UCSD p-System, and PC-DOS are supported. $2,200 to $7,200.

Micromax Systems, Inc.
San Diego, CA

PC/Colormax. A multifunction combo card that offers IBM monochrome support, color/graphics support for RGB, composite video and standard black/white monitors, plus parallel printer adapter all on a single expansion card. Features 16K RAM plus light pen input in monochrome mode and parallel printer port in color/graphics mode. Compatible with IBM monochrome board, IBM color/graphics adapter, and IBM parallel printer interface card. $479.95.

Microware, Inc.
Kingston, MA

8087-3 Numeric Coprocessor. Speeds up the IBM pc compiled and assembled code by factors of five to one hundred. The coprocessor fits into the 40-pin socket adjacent to the 8088 on the pc and XT motherboard. Software support is available to drive the chip. Six-

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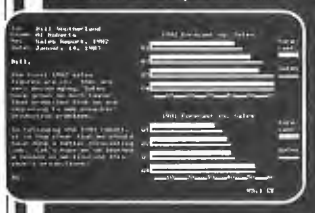

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Northwest Instruments Systems, Inc.
Beaverton, OR

mu-Analyst Interactive State Analyzer. A real-time software debugging tool. Uses an external mainframe and can be configured with from sixteen to eighty channels. Selective storage of data is possible using fifteen trigger/store states and four word recognizers per state. The system is fully programmable using Pascal or assembly language. Basic sixteen-channel system, $2,995. Sixteen-channel expansion cards, $895 each.

Personal Computer Products
Santa Clara, CA

RS-232 Analyzer. A plug-in adapter that shows the RS-232 devices. It may be left permanently wired in any circuit. $149.95.

Persyst
Irvine, CA

Timeport. A single-board multifunction module that offers a calendar clock, one or two asynchronous serial ports, and a parallel printer port. $225.

Uniport. A calendar clock and bidirectional parallel printer port on a single module. $155.

Time-Spectrum. A single-board multifunction module that offers a calendar/clock, three I/O ports, and memory expansion up to 512K. $395.

DCP-88. An 8088-based communications processor module that offers synchronous/asynchronous communications and supports async, bisync, HDLC, and SDLC protocols and line printers to 600 lpm. $695.

Plantronics, PC+ Enhanced Graphics
Milpitas, CA

Colorplus Graphics Board. Includes sixteen colors in medium resolution, four colors in high resolution; parallel printer port; compatible with existing pc software. Includes two graphic applications. $559.

Prelude Computer Corp.
Cupertino, CA

Serial Port Plus Clock Card. IBM pc/XT expansion card with IBM-compatible serial-communication port and battery backed up clock/calendar. Fits XT small slot. Utility disk provides clock software. One-year warranty. $129.

Printer Port Plus Clock Card. IBM pc/XT expansion card with IBM-compatible printer port and battery backed up clock/calendar. Fits XT small slot. Utility disk provides print spooling and clock software. One-year warranty. $129.

384K Memory Plus Game Adapter Port Card. Expands pc/XT memory to 640K bytes if you have 256K system board, to 448K if you have 64K system board. Includes IBM compatible game adapter port all on one card. One-year warranty. $229.

Six Function Card. Expansion board for pc/XT features IBM-compatible game port, serial port, printer port, clock/calendar and memory expansion of up to 256K bytes. Utility disk provides print spooling and clock software. One-year warranty. $269 with no installed memory. Tested 64K RAM chip set, $69.

Quadram Corp.
Norcross, GA

Microfazer. A universal print buffer with 8K to 512K RAM. Receives information in its memory, then sends it to the printer at an appropriate speed. Comes with a copy/pause feature allowing additional copies of the buffered information. The unit is sized to stack with popular modems and other peripherals. $159 (8K), $189 (16K), $225 (32K), $299 (64K), $895 (256K), and $1395 (512K).

Serial-to-parallel and parallel-to-serial, $199 (8K), $220 (16K), $260 (32K), and $330 (64K).

Quadboard. A six-function expansion board. Designed to increase capabilities at minimum cost while using only one internal expansion slot. The functions provided include RAM expansion from 64K in 64K increments, and EIA RS-232C serial interface for asynchronous communication, a Centronics-compatible parallel interface for printer driving, and a battery-powered quartz clock/calendar to keep your pc's internal clock always on time. 64K, $395. 256K, $595.

QuadColor Color Video Cards. Has color bit-mapped graphics of 640 by 200, or 640 by 400 pixels in up to 128 colors at once on the screen. Each dot can be individually addressed and Quadcolor offers twice as much memory as IBM's board (32K compared to 54K). In the text mode this extra memory allows twice as many active and visual pages as IBM's Color Graphics Adapter: sixteen in 40-column, eight in 80-column. In the graphics mode, the extra memory allows the user to create two complete pages. IBM can offer only one page in the graphics mode. Two QuadColor video cards are available: QuadColor I, hardware and software compatible with the IBM Color/Graphics Monitor Adapter, $295. QuadColor II with bit-mapped resolution of 640 horizontal by 200 vertical pixels, $275.

Quadlink. Allows Apple software to be used in the pc. Quadlink, a simulated Apple computer on one board, is installed in one IBM pc expansion slot. Translates Apple's DOS 3.3 software into language the pc can understand. There is no need to convert or reformat any disks. $680.

Qume Corp.
San Jose, CA

Sprint 11/40-130 Plus. Daisy wheel printer, available in standard 15-inch width or wide-track format. Offers a 22-inch carriage width and can be used for spreadsheet applications, as well as large format information displays and has a print line of 293 characters. $2,965.

QVT-103 terminal. Comes with a standard 12-inch or optional 14-inch viewing screen in either green phosphor or amber. The terminal has a full tilt/swivel adjustment and a low profile, detached keyboard. $1,095.

R&H Electronics, Inc.
Buellton, CA

Guardian Angel. Uninterruptible power supply provides protection against data loss occurring from blackouts, brownouts, and power surge. $595.

RB Robot Corp.
Golden, CO

RB5X: The Intelligent Robot. Completely programmable personal robot. Comes fully assembled, with software that allows it to learn its environment; sonar and tactile sensors; charger-finder routine; and an array of options, including an arm, vacuum attachment, and a robot control language that allows you to program robot using common English. $1,795.

SCION Corp.
Reston, VA

PC640 Professional Color. A high-performance color graphics display system which provides 640 by 480 resolution and enables the user to simultaneously display 16 colors chosen from a palette of 4096. The PC640 comes with HALO, a library of powerful graphics primitives. $1,595.

Seattle Computer Products, Inc.
Seattle, WA

RAM+3. A multifunction card. A serial port, a parallel port, a lithium battery-powered clock, and a variety of expansion memory options, from 0K to 256K. $210 to $620.

8087 Package. Includes both the 8087 floating point math coprocessor and two types of software. One program lets you run your regular Basic programs and substitutes the 8087 routines where they are faster. The other program allows you to include 8087 coprocessor instructions when you are using the IBM (Macro-86) Assembler. $395.

Security Microsystems Consultants
Staten Island, NY

Quickon. A module that allows the pc to boot up within four seconds of turning on

HARDWARE

power, regardless of how much memory the pc has. Simple to plug in and requires no expansion slot. Works with all pcs except the XT. $49.

Staff Computer Technology
San Diego, CA

The Key. A hardware module that works in conjunction with software to protect software from being printed. The module is easily installed in the gameport. The key is factory programmed with a security code. Each software supplier can have a code known only to it. The end user is free to make as many backup copies as needed, but can run them only if the key is installed. Quantity of 100 at $60.

StarLogic
Chatsworth, CA

Internal 5 1/4-in Floppy Drives. One side, $160. Two sides, $210.
Internal Half-Height 5 1/4-in Floppy Drives. One side, $210. Two sides, $420.
5 1/4-in Winchester Disk Systems. $1,295-$1,695.

Sysgen, Inc.
Fremont, CA

Sysgen II-10 and Sysgen II-20. Winchester-type drives provide storage of 10M or 20M respectively, with built-in streaming tape backup. For use with the pc using PC-DOS or CP/M-86. Backs up 10M in two minutes. Allows backup by individual files or whole disk volume in image fashion. Sysgen II-10, $2,995. Sysgen II-20, $3,795.
Sysgen Image. A 20M streaming tape backup for XT, pc on pc-expansion chassis. Designed to operate with PC-DOS, backs up at a rate of up to 3.5 Mbytes per minute. Allows backup up to 20M. $995.

Tall Tree Systems
Palo Alto, CA

JRAM. A 512K memory board for the pc, XT, and compatible machines. A hardware pager allows more than 640K in any system. Software is included. JFORMAT for DOS 1.10 and JETDRIVE for DOS 2.0. $800.

Tamtron
San Jose, CA

PCaL. A track-seek program for the pc and look-alikes. A technician needs a dual trace scope with external trigger, a Dysan reference disk (optional with *PCaL*), and the OEM manual for the drive. With *PCaL* all practical functions can be tested. $150-$200.

Tecmar, Inc.
Solon, OH

The IEEE Interface. Implements IEEE-488 industry standard to enable the pc to operate as system controller or as an addressed talker/listener. Has DMA and interrupt capabilities. Available library of machine language subroutines called from Basic or Fortran for data transaction with GPIB. $395.
The Lab Master. A sophisticated system that includes sixteen channels of 12-bit A/D with a 30 KHz conversion rate, two channels of 12-bit D/A, five timer/counters, and three 8-bit parallel ports. Options include programmable gain up to 1,000, 14- and 16-bit accuracy, 40 and 100 Khz conversion, and up to 256 channels. From $995.
The Voice Recognition Board. Permits "hands off" computer control by providing a highly accurate user-trained voice-recognition system. A 100-word vocabulary can be stored in 8 kilobytes of on-board dynamic memory. Optionally, 16 kilobytes of CMOS memory can be installed on the board, providing storage for up to 200 words. $995.
The Captain. Performs eight key functions in one expansion slot upgradable memory to 384K. Features a clock/calendar, serial port (COM1 or COM2), parallel port printer, print spooling utility, and PAL option to restrict certain information on a "need to know" basis. $795.
The 2ndMate. Has the I/O capabilities of four standard pc options, plus clock/calendar and PAL software lock-out option. Provides two serial ports that mimic the operation of two IBM asynchronous communications adapters and two printer ports. $295.
The 3rdMate. Gives the I/O capabilities of three standard pc options, plus clock/calendar, direct-connect telephone modem, and PAL software lock-out option. Provides one serial port and two printer ports. $445.
The 1stMate Board. Combines serial port (COM1 or COM2), parallel port (LPT1), clock/calendar with battery backup, up to 256 kilobytes memory, and optional programmable lock-out to protect access to machine or software. $389.

Tesserax, Inc.
Homosassa Springs, FL

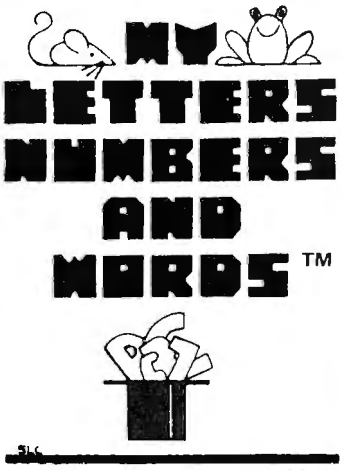
Y-Cable. Allows simultaneous use of two IBM-compatible joysticks on the pc. $49.95.

Titan Technologies
Ann Arbor, MI

Titan. The SASI-compatible hard disk host adapter and parallel port includes clock calendar, serial ports, and RAM memory (64K to 576K). $695.

Total Logic Corp.
Fort Collins, CO

LA-200. Transforms the pc into a logic analyzer for data analysis, software tracing, documentation, and storage. Features: 15-MHz



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Keith Oswald and Joseph Juhasz
of PCsoftware, San Diego, CA

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HARDWARE

capture rate, 32-channel data path, six clock qualifiers, eight levels of start/end triggers with four windows in path, bit/timing display on screen or hard copy. $1,750.

Transtar/Vivitar Computer Products
Bellevue, WA

Transtar 120 Daisywheel Printer. Compact, light, and portable. Prints at fourteen characters per second. Diablo 1610/1620 code compatible with most of the leading word processing packages on the market. Includes a six-month parts and labor warranty. $599.

Transtar 130 Daisywheel Printer. Compatible with all major word processors using Diablo 1610/1620 routines. Autoload feature automatically loads a single sheet of paper into one of four selectable positions ready to print. $895.

Transtar 315 Color Graphics Printer. A unique four-hammer printhead allows the 315 to print up to thirty shades of color on a single pass. $599.

Universal Computer Products
Irvine, CA

The USM-1. A speech and sound synthesizer with a continuous speech of unlimited vocabulary, having the excellent quality of the new Votrax SC-02. It also provides six voices of music and sound effects, IBM game adapter, dock-calendar, Centronics port. $445.

V R Data Corp.
Folcroft, PA

The Panther. Low profile 5M removable hard-disk cartridge drive. Ideal for backup of a fixed hard disk. $1,495.

The Panther. Low profile 5M hard disk (subsystem) includes drive, controller, power supply. $1,395.

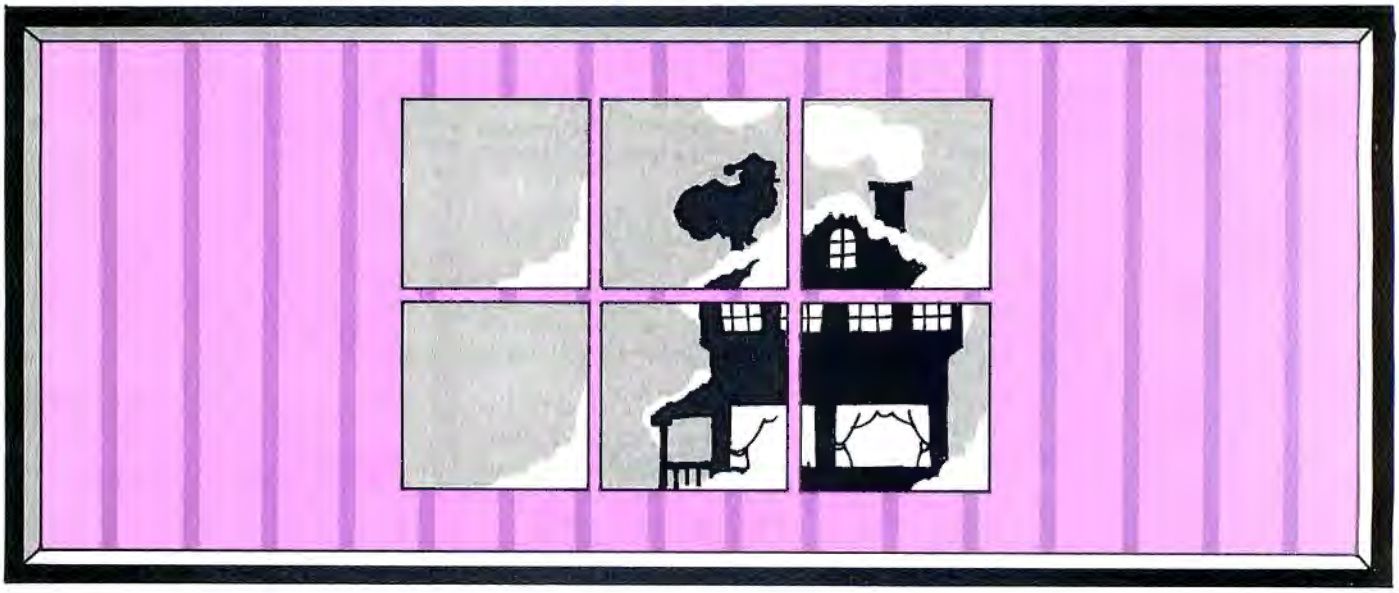
Hard Disk III. Five-megabyte hard disk drive (subsystem) includes controller, power supply, drive. $995.

Hard Disk III. Ten-megabyte hard disk drive (subsystem) includes controller, power supply, and drive. $1,249.

Fifteen-megabyte hard-disk drive (subsystem) includes controller, power supply, and drive. $1,449.

Hard Disk III. Dual 10M hard disk (subsystem) with 20 megabytes total. Includes two 10M drives, controller, and power supply. $1,999.

Clock Calendar. DOS compatible. Comes with software driver. Will fit in any slot including the small slot in back corner. Three-year lithium battery backup. $74.95.



HOME

The BBE Co.
Houston, TX

Jogger Logger. A computerized runner's diary that allows the user to record and accumulate distances, times, and conditions by date; summarizes and computes average rate (pace) and other statistics by month and year and keeps an accurate record of a running program. $19.95, plus $2 shipping.

Greetings. An address book with birthday and anniversary memory prompters that also details the thirty major holidays and gift-giving occasions by date and day of the week through 1987. *Greetings* also produces alphabetized mailing lists and includes modern and traditional gift ideas for anniversaries and birthdays. $19.95, plus $2 shipping.

BPI Systems, Inc.
Austin, TX

BPI Personal Accounting. Brings computerized accounting home. Manages finances quickly, accurately. Provides exercises on sample books, built-in or customized account codes. Records financial transactions. Automates bank reconciliations and budgets. Prints checks. $195.

ColorCorp
Bloomfield Hills, MI

ColorBiz Loan. Analyze numerous financing alternatives, make a quick analysis of various loan situations. Calculates any loan value, stores loans, and prints or displays monthly or yearly amortization schedules. Check loan status for the period desired. Determine balloon payoffs, cash requirements, and so on. $29.95.

ColorBiz Diet. Calculate nutritional content of food by calorie, fat content, carbohydrate, protein, and vitamin and mineral values. Chart daily intake, determine ideal food consumption, maintenance level, weight gain or loss, requirements for high endurance and stamina. Select from basic food groups and requirement and have a computer calculate your meals with preferences. $49.95.

ColorBiz Biorhythm. Charts the natural

HOME

body cycles in personal, social, or business situations. Includes congeniality comparisons, display and graphic printout, storage and retrieval of names and birthdates, and thorough biorhythm reference guide. $29.95.

Compu-Quote
Canoga Park, CA

Coins. Allows a coin collector to catalogue an entire collection and obtain various reports that provide personal investment information. The principal feature of *Coins* is a built-in market value file that supplies latest pricing information. $95, plus $1.50 shipping. California tax 6 percent. Quarterly market value updates, $25.

Computer Age of San Francisco
San Francisco, CA

Personal Mailer. Searches and sorts on twelve data fields. Data field lengths may be defined. Files searched by keys. Data files may be redefined without data reentry. Prints optional labels up to one, two, or three across. Can be used with *Mailmerge.* Program capacity, 65,535 records. MS-DOS compatible. Requires 128K. $79.95.

Continental Software
Los Angeles, CA

The Home Accountant. Personal and small business financial management program, tracks finances automatically. The program budgets, forecasts, keeps track of checkbooks, reconciles bank statements, and prints checks. $150.

Cortland Data Systems
Chicago, IL

The Electronic Checkbook. Has up to 100 budget categories, prints checks using a standard format, or allows creation of individual formats. Enter data rapidly using a quick coding system. $120.

Craftsbury Software
Washington, DC

Micro Chef. A professional menu planner now available for the home. Specially selected, fully tested gourmet recipes from around the world. Rescales serving sizes, prints shopping lists, finds lost or forgotten recipes instantly, prints recipes in 3 x 5 card format, and creates personalized recipe disks. $39.95.

Wine Connoisseur. A combination cellar inventory and record of tasting notes that provides quick, accurate access to information on all wines in storage and pinpoints the right wine for the occasion in moments. It features fifteen inventory descriptors, twelve tasting descriptors, and comes with an instructional disk that teaches how to select and taste wines. $39.95.

Memory Jogger. A flexible appointment and event calendar calibrated for the next 100 years. It never forgets a bill, birthday, engagement, or project deadline. It features one-time entry for recurring events and rapid search over all fields. The day of the week is computed automatically, and events are listed in chronological or alphabetical order. $39.95.

Personal Wealth. A comprehensive inventory system for keeping track of investments, valuables, and other personal possessions. Perfect for insurance, stock market, warranty, estate purposes, and so on. Includes seventeen descriptor fields, multifield search, sort by item name or category, and math functions. $39.95.

People Tracker. A mailing list and address book program that features instant multifield search, name or Zip Code sort, labels in up to four columns, customized print formats, special multiple coding fields, auto date, and comment line. $39.95.

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HOME

Data*Easy Software
Foster City, CA

Telephone Directory. This directory is a fast and easy way to keep a name and address book, featuring two phone numbers, a special date, and a brief personal note. Data may be listed or displayed on the screen. $35.

Data Systems International
Harrisburg, PA

Data-Timer. Organizes and sorts all pertinent information from a personal time-record book. Can be used to enter information concerning billing, services performed, and various other time-management records. Information can be summarized at the end of the day and entered on the computer from the diary. $295.

DEG Software
Houston, TX

InShape. With a computerized food dictionary and automatic calculation of aerobic exercise points, *InShape* records up to a year of information on daily food intake and exercise performance. Various plotting functions, including sixty-day and fifty-two-week summaries, give the user an accurate picture of diet and exercise patterns over time. $95.

PerFin. A personal financial records-keeping program, *PerFin* handles your checkbook and up to forty user-defined accounts. *Perfin* provides an easy-to-use method for keeping track of income, expenses, and credit cards. Includes budgeting, editing, and reporting facilities. $65.

Dynacomp, Inc.
Rochester, NY

The Family Budget. An electronic home data records-keeping program. Records expenditures, both cash and credit, and income on a daily basis for the period of one calendar year. $34.95.

Personal Finance System. Offers the user one of the most complete financial management packages available, allowing the individual or small businessman complete flexibility in maintaining all aspects of financial record-keeping. Depending on configuration, you will be able to store from 300 to 2,000 transactions on each disk. $39.95.

Ensign Software
Boise, ID

Checkbook Accounting. Provides ledger capability for personal, home, or small business finances and allows charting of accounts; allocating income to various accounts; obtaining itemized lists by date, person, and/or account; establishing budgets;and observing trends. Prints ledgers, financial statements, and accounts receivables/payables. $69.95.

Bowling League Secretary. Maintains all bowling league statistics and memberships, computes individual handicaps and team standings, and prints various reports. Two disk drives. Eighty-column monitor, serial or parallel printer useful. $99.95.

Gourmet Software
San Jose, CA

Pizza Program. Answers the question, "What are we having for dinner?" A data-based meal-planning system that generates delicious dinner menus and shopping lists, allowing you to modify the database to create menus that fit tastes and budgets. Details shopping lists. $34.50 plus $2 shipping.

International Computers
Mexico Beach, FL

Mr. Lister. Makes mail list management simple. Data files may contain 2,000 entries (disk space allowing). Mini-version of *Mr. Lister 2.0.* $50.

Healthware
Georgetown, TX

Master-Control. A physician-designed, comprehensive weight-management program. A database of approximately 3,000 foods, including brand names and fast foods, and one hundred exercise activities. Identify problem areas and work to correct them. $69.95, plus $3 postage.

Marathon Software
Clancy, MT

Running Log. Stores and analyzes running data. Up to thirteen items per run, including miles, course, time, notes, two user-defined items, and so on. Two runs per day. Many graphs and tables.The *Running Log* can be tailored for individual runners. Two disk drives, color/graphics adapter, eighty-column display. $39.95.

Micro Vision
Commack, NY

Tax-Relief I. A tax package for individual use. Supports fifteen of the most commonly used schedules and forms. Uses an efficient and convenient method of data entry, editing, and reviewing. On-line help is provided. Prints signature-ready returns. $149.

Monogram, a division of Tronix Publishing, Inc.
Los Angeles, CA

Dollars & Sense. A personalized financial database that gives the user fast access to information. $165.

Norell Data Systems Corp.
Los Angeles, CA

Computer Chef. Automated recipe file and computerized cookbook turns your pc into a valuable kitchen assistant that saves you time and money. It will suggest recipes to use up your leftovers. *Computer Chef* calculates the amount of each ingredient needed to increase or decrease the number of servings a recipe makes, or, given a specific amount of an ingredient, it calculates the correct amount for the remaining ingredients and adjusts the servings. $49.95.

N-Squared Computing
Silverton, OR

Nutritionist. A diet-analysis program that graphically displays analyses in weight and percentage of RDA for nineteen nutrients. Identifies deficiencies and excesses and their sources. Automatically creates food lists for special requirement diets. Includes all utilities for editing, expanding, and changing database and RDA files. $145.

Nutritionist II. An interactive graphics diet-analysis program that analyzes foods, meals, recipes, and diets in weight and percentage of RDA for thirty-six nutritive components including trace elements and amino acid breakdown. Identifies sources of deficiencies and excesses and identifies foods meeting user-specified requirements. $295.

Omega Software, Inc.
Chicago, IL

Tax Templates. VisiCalc templates that will handle most of the tax schedules used in conjunction with the federal 1040 forms. A copy of Laser's *Your Income Tax* is included. This package is designed for use with versions of *VisiCalc* providing Data Interchange Format (DIF) and Boolean Logic @IF functions. The Advanced Version of *VisiCalc* for the pc may be used. $89.95.

Pacific Data Systems, Inc.
Culver City, CA

MoneyTrack. Professional-level accounting system for people with substantial financial activities. Keeps track of all transactions. Includes multiple distributions, for example, principal and interest. Features efficient bank statement reconciliation, check printing with choice of formats. No computer experience needed. $450.

Realty Software
Redondo Beach, CA

Home Purchase. Aid to home buyers and sellers in making knowledgeable decisions when buying and comparing properties. Studies may be made on several potential homes, allowing very thorough financial comparison including best means of financing. $50.

Sapana Micro Software
Pittsburg, KS

Write a Letter. A menu-driven program to

create simple letters and print them. Program features include the ability to create a letter, edit/display the letter, write a letter to disk, delete a letter from disk, display files on disk, reformat the text. $29.95.

Expense-Track I. A menu-driven program to keep track of expenses and prepare useful reports. Program features include the ability to enter expenses, list expenses, list expenses categorically, edit expenses, compact the file, open/close/create file, and list files. $49.95.

Household Inventory Track I. A menu-driven program to keep track of household items (item name, comment, date purchased, purchase value, current value, depreciation/appreciation, category codes, and so on), print, edit, and update current values. Can also be used as a simple database management program. $49.95.

S-C Software Corporation
Dallas, TX

Classical Music. Bobby Deen has transcribed the "William Tell Overture" by Rossini and Tchaikovsky's "Nutcracker Suite" for six voices. Compatible with the ALF synthesizer, or the Applied Engineering synthesizer. $15.

Sundex Software
Boulder, CO

Personal Payables. Takes care of all bill paying and keeps personal and family bookkeeping well organized and up-to-date. Helps at tax time too. Prints on personal and continuous-form checks. Handles recurring payments and alerts you to those coming due. Tracks up to ten accounts, with flexible reporting by date, payee, tax, and so on. $49.95.

Certified Personal Accountant. Organizes, analyzes, and manages personal finances. Easy to learn and use with on-line help and tutorial. Use it for tax planning, budgeting, bill paying (with checkwriting), and stocks. $149.95.

CPI. A personal portfolio manager. Calculates long and short realized and unrealized gains; prints 1040B and 1040D reports; lets you watch stocks you don't own; handles splits, options, dividends, commissions, and taxes; and lets you define spreadsheetlike analyses. $149.95.

Systech, Inc.
Bartlesville, OK

Money Planner. Helps you plan financial affairs: net worth planning and reporting; household budgeting; thirteen financial planning aids in lending, borrowing, and investing. A running balance adder balances checkbooks or can be used as a calculator with item description. $39.

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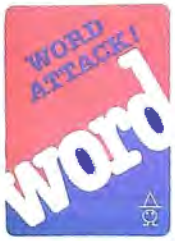

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EZ Converter. Solves almost any common conversion problems. Converts from one unit of measurement to another in U.S. system or from English to metric system and vice versa. Covers distance, area, volume, weight, temperature, fraction, decimal, and so on. $29.
PC Wizards. Contains five programs for the family: *Math Tutor* helps improve children's math skills (age 6-16). *EZ Converter* saves you time in dealing with measurements (English and metric). *Mail Master* stores, updates mail list, and prints labels. *Money Planner* organizes and controls money matters. *Record Keeper* keeps track of personal, financial records. All five for $75.
Mail Master. Provides retrieval and update of personal or business name directory. Add, change, delete, display, and print names with their relevant information. Scan or print neatly designed mailing labels with full control of label size and type (1,2,3,or 4 up) and name selection (by Zip Code, range, or name). $39.

Systematics
West Bloomfield, MI
GolfCap. Calculates USGA type handicaps. Can be used for leagues. Stores twenty scores (par and date) per golfer, prints lists alphabetically or by handicap. Up to 250 golfers per single-sided disk. Requires two drives. $49.95.

1040 Software, Inc.
New Hyde Park, NY
Plan 1040. An income tax planner that runs multiple tax strategies. Covers both 1983 and 1984 tax years. $150.

Virtual Combinatics
Rockport, MA
Micro Cookbook. A computerized cookbook and recipe management system with over 150 international recipes and cookbook-type reference data. Enter, modify, and remove recipes, even create your own cookbook disks. Search by recipe name, ingredient(s), and/or classifications. Produce a shopping list and adjust recipes for serving size. $40.

John Wiley & Sons, Inc.
New York, NY
Personal Investment Analysis (IBM pc Version). A personal financial planning program that analyzes investment options. Lets users assess the relative profitability of tax-free versus taxable securities, analyze mortgage terms, weigh convertible bonds, and plan a retirement income program. $60.
Investment Tax Analyst (IBM pc Version) by Advanced Investment Strategies. A *VisiCalc* template to help individual investors or financial professionals weigh the tax effects of potential investments. Incorporating all current federal tax laws and allowing for state tax input, it calculates tax liabilities, credits, and savings expectable from any investment(s) for up to six years and compares net present value. $150.

Xor Corp.
Minnetonka, MN
Manage your time with *Thoth*, your money with *Blu Chip* portfolio manager. Program with *C Tools.* Explore counterintelligence as *Agent 2.0*, match strategy with *Edo*, go up against *St. Hippolyte's Wall.* Priced from $39.95 to $99.95.

PUBLICATIONS

Addison-Wesley Publishing Co.
Reading, MA
Pascal for the IBM Personal Computer, by Ted G. Lewis. The more than half a million Personal Computer owners now have a source for discovering the most effective ways to program in Pascal. The author details how to write effective programs in both IBM Pascal and UCSD Pascal, explaining the advantages of using one system or the other for specific programming problems. *Pascal for the IBM Personal Computer* is for Pascal programmers familiar with other machines who want to transfer those skills to the pc and for pc users who want to learn Pascal. $15.95.
A Guide to the Best Business Software for the IBM PC, by Richard C. Dorf. A comprehensive guide to the best business software packages available for the pc. Dr. Dorf covers software for all areas of business computing—including accounting, spreadsheets, time management, personal investment, database management, communications, graphics, and the new systems that combine several different applications into an integrated package. $12.95.

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MS-DOS is a registered trademark of Microsoft.

PUBLICATIONS

The Addison-Wesley Book of IBM Software 1984, edited by Robert P. Wells, Sandra Rochowansky, and Michael Mellin. Lists and evaluates over 300 software packages designed for the pc. Along with a detailed description, each program is given a letter grade (A through F) so that consumers can decide quickly whether the software program is right for them before they buy it. $19.95.

And/Or Press
Berkeley, CA

The IBM Personal Computer Handbook, edited by Dzinter E. Dravnieks, et al. Gives you the background and information you need to make the most intelligent hardware and software decisions and boost your productivity. Features chapters on spreadsheets, word processing, databases, telecommunications and networking, business, and games. Included are chapter glossaries, annotated bibliography, and a comprehensive resource directory. $19.95.

Architecture Technology Corp.
Minneapolis, MN

PC Perspectives. A newsletter for professional and business users of the IBM Personal Computer. Issued monthly, *PC Perspectives* covers all the latest happenings in the pc and pc-compatible world. Also included are short feature articles to keep users abreast of the latest technology as it affects the pc. Issued monthly, subscription rates are $195 per year, United States; $245 per year, foreign.

Black Box Corp.
Pittsburgh, PA

The Black Box Catalog. A mail-order catalogue of over 300 data communication devices and accessories. Products range from cables and switches to protocol converters and statistical multiplexors. The catalogue is free.

The Book Co.
Los Angeles, CA

The Book of IBM Software 1984. Offers a comprehensive critical analysis of each program. Each evaluation is written by an expert in his or her field—business, education, communications, or professions such as law or medicine. $19.95.

Robert J. Brady Co.
Bowie, MD

Handbook of Basic for the IBM PC (Schneider). The only currently existing manual for the pc designed with the beginner in mind. Organized by Basic programming statements, the user can go directly to desired information without confusion or delay while programming. This guide is essentially a layman's rewrite of the *Basic Reference Manual* supplied with the pc. This book presupposes no knowledge of Basic and explains all materials supplied in the manual. $15.95.

Games, Graphics, and Sound for the IBM PC (Strickland, Rockwell, and Bowyer). Learn-by-doing guide for the beginner teaches how to program the pc for graphics and sound. Instructions for programming are included in Basic, Pascal, and Fortran in many cases. Explains how to integrate sound and graphics into animation with the help of more than seventy working examples. Also includes a step-by-step example of the creation of a simple video game. Software package kits available. Book, $18.95. Book/disk, $64.95. DOS disk, $40. p-System disk, $30.

Pascal Programming for the IBM-PC (Bowyer and Tomboulian). Brings the pc and Pascal programming together. Emphasizes graphics and sound applications. Book, $17.95. Book/disk, $44.95. Disk, $30.

IBM Personal Computer: An Introduction to Programming and Applications (Goldstein and Goldstein). Written in the same easy-to-read, self-study format as the first edition, this new book includes two new chapters on Basic programming. These new chapters emphasize the importance of structuring and planning programs as well as important information on debugging programs. The chapter on files includes an enlarged section on random-access files. $18.95.

8087 Applications and Programming for the IBM PC and Other Personal Computers (Startz). A clearly stated and comprehensive explanation of the number-crunching 8087 microprocessor. Beginning with a nontechnical introduction, the book evolves into a detailed technical explanation of the 8087 microprocessor. Sections for both the technical and nontechnical user. $19.95.

Wm. C. Brown Co. Publishers
Dubuque, IA

The IBM Personal Computer Executive Library. Contains over 800 pages of step-by-step instructions within four books: *User's Guide with Applications, Data and File Management, Introduction to Graphics,* and *Techniques of Basic.* Over 200 ready-to-run programs cover mailing lists, games, file management, and graphics. $50.85.

Chilton Book Co.
Radnor, PA

A Critics Guide to Software for the IBM-PC and PC-Compatible Computers, by Phillip I. Good. Evaluates the most popular spreadsheet, word processing, data management, graphic packages. For professionals in business, agriculture, law, and health. $12.95.

Concept Group, Inc.
El Paso, TX

Masterspec2 Disk Library Service. Available to current subscribers with PSAE division AIA Service Corporation. *Masterspec2* A/S/C and M/E text on 5 1/4-in disks for microcomputers in Basic and Short language versions. Text includes "notes to specifier" (nonprinting) in A/S/C library. Requires *WordStar* (CP/M). First year, $695. Renewal fee, $250.

Digit Magazine
San Francisco, CA

Digit. A magazine designed for young people aged 10 to 16 and their families who are interested in computers and high technology. Single copy price, $1.95. Six issues, $8.95.

dilithium Press
Beaverton, OR

More Than 32 Basic Programs for the IBM PC. Full of programs with practical applications, educational uses, games, and graphics. Each of the thirty-seven chapters fully documents a different bug-free program. And if you have a good working knowledge of Basic, you can devise and implement your own program changes. Book/software package, $34.95.

Electronic Courseware Systems, Inc.
Champaign, IL

A Planning Guide to Successful Computer Instruction. For individuals interested in the educational applications of computers. Includes an introduction to computer hardware, selection criteria for computer hardware, selection and evaluation criteria for courseware, computer instruction site development, computer instruction site management, sources, and software for educational use. Eighty-one-page three-ring binder. $19.95.

Ellis Computing, Inc.
San Francisco, CA

Nevada Cobol Applications Book. Contains seven Cobol programs designed to cover budget, personal finance, labels, and pre-Cobol. The seventy-three-page book contains the complete Cobol source code in addition to the superior user documentation. $9.95.

Elsevier Science Publishing Co.
New York, NY

The Software Catalog. Produced from *The International Software Database.* A quarterly publication that gives complete details on over 50,000 software packages. Program details include vendor information, full program details, machine compatibilities, price, warranty information, source code, and update availability. *The Software Catalog* is

PUBLICATIONS

available in two versions: microcomputers $69/single copy, $142.50 per year; and minicomputers $95/single copy, $191.50 per year.

Hayden Book Co., Inc.
Hasbrouck Heights, NJ

IBM Basic From the Ground Up. A book that serves as a complete guide to the Basic language for the IBM personal computer. $15.95.

Hy-tek
Dayton, MD

Selling Your Software—The Personal Computerist's Guide to Fame and Fortune-. . .Maybe! A guide of what to do and what not to do in trying to sell that program you have labored over for so long. Written by the staff of Hy-Tek's software division. $9.95.

The Apple/IBM PC Dictionary. Allows the pc (or compatible) user to easily convert all those published Apple programs for use on the pc (or compatible) or vice-versa. Along with the conversion information is a short description of the function of each command. For the beginner as well as the advanced computerist. Available early 1984. Under $25.

I.B. Magazette
Shreveport, LA

I.B. Magazette. Build your program library, sharpen your skills, and have fun while expanding the usefulness of your pc. Each bimonthly disk contains detailed step-through tutorials, programs, utilities, hints, reader-contributed material, even music and games. Always includes a major program or a demonstration version of commercially available software. Return the original along with your check for the next issue in the provided postage-paid mailer. $15.

Infopro, Inc.
Bensalem, PA

The Directory of Independent PC Hardware and Software. A comprehensive directory of products that run on the IBM PC. Provides 150 pages of software and hardware descriptions and reviews in a loose-leaf binder, allowing package-to-package comparisons. $29.95.

Intercalc
Scarsdale, NY

Spreadsheet. A monthly newsletter published by Intercalc, an international *VisiCalc* users' group with over 2,000 members. *Spreadsheet* offers new templates, tips, and hints on how to get more out of *VisiCalc*, and reviews other products. $42 per year.

Longman Financial Services Publishing
Chicago, IL

The Buyer's Guide to Financial Services Software. A 650-page directory of microcomputer software programs for the financial services industry. Helps the reader to locate and compare available software programs. Includes information on banking; financial planning and taxes; real estate; and stocks, bonds, and commodities software programs. $100.

Mentat
Brooklyn, NY

Mentat. An amateur magazine. Contributors write articles about their interests in computers and computing. *Mentat* is free; contributors only pay postage and for duplicating their contributions.

MENTOR . . . the magazine on disk
San Francisco, CA

MENTOR. Magazine on disk features articles and programs designed to help you cope with the microcomputer revolution. There's no need to type in programs, since they are already on disk. $44.95 for six issues (one year), or $14.95 for two trial issues.

Menu, The International Software Database
Ft. Collins, CO

Menu produces *Software Reports* for customers with specific software questions. A customized search of the International Software Database to find software to fill the customer's needs can be performed in seconds over the telephone. The ISD contains complete details on over 50,000 software packages. Fees for a *Software Report* are $25 for the first ten programs, $1 per program up to 50, and .50 per program thereafter.

Microcomputer Applications
Fairfield, CA

High-Tech Consulting. Describes essential information for anyone considering a career as a computer consultant. $18.95.

Microware, Inc.
Kingston, MA

87/88 Guide. A handbook on writing code for the 8087 and 8088 using the IBM assembler. Full of examples and code. $30.

Mini Magic Co.
West Hartford, CT

Basic Reference Cards. Descriptions of Basic commands, functions and statements. $25.

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PUBLICATIONS

Osborne/McGraw-Hill
Berkeley, CA

IBM PC DiskGuide. This quick-reference booklet summarizes all statements, commands, and keywords applicable to DOS, Edlin, and Basic. Organized by function, with tables, charts, and diagrams for additional clarity. $8.95.

Graphics Primer for the IBM PC. Learn to use your system's graphics commands to produce useful color graphics for business, engineering, education, and entertainment applications. $21.95.

The Osborne/McGraw-Hill Home Computer Software Guide. A comprehensive reference guide to every major home computer software package. Covers personal finance, investment, education, word processing, and games. $11.95.

54 VisiCalc Models: Finance-Statistics-Mathematics. Manage investments, loans, taxes, and solve over thirty different statistical and mathematical problems with this collection of ready-to-use *VisiCalc* programs. Just key them directly into your computer. $15.95.

Your IBM PC Made Easy. This basic operating guide covers all the fundamentals of the computer system. Contains step-by-step running instructions, software use and care, trouble-shooting tips and a guide to IBM supplies, services, and user groups. $12.95.

Your IBM PC: A Guide to the IBM PC (DOS 2.0) and XT. Everything you need to know to set up and operate your pc or XT. There are tutorials in Basic programming as well as instructions for using color graphics and sound. $17.95.

PC Clearing House
Fairfax, VA

Directory of over 21,000 micro software packages for business programming, education, home, and specialized vertical markets for IBM, Apple, and other micros. $39.95.

PC-Demo
San Francisco, CA

PC-Demo. Software demo programs of the latest pc software. Each month, subscribers receive a single-sided disk filled with three to five software demos, a catalog of demos that can be ordered individually, and a coupon good for $6 off any software purchase from 800-Software. $18 for three issues.

Personal Computer Journal
Spokane, WA

Personal Computer Journal. A disk-based magazine with games, utilities, and filing systems. Each issue has eight documented, ready-to-use programs as well as quick-reference cards and inserts for IBM's manuals.

PUBLICATIONS

Send two blank disks and a stamped envelope for a copy of issue 1; a copy of the free issue will be enclosed. $45 per year for 320K drives; for 160K add $1.50 per issue for two-disk set.

Prentice-Hall, Inc.
Englewood Cliffs, NJ

Graphics For the IBM Personal Computer, by Donald Hearn and M. Pauline Baker. Provides a basic but complete introduction to the concepts and techniques of computer graphics and details the graphics applications capabilities of the pc. $18.95.

Programming for the IBM Personal Computer, by David J. Bradley. This how-to tutorial begins with details of the pc's operation, teaches how to write assembly language programs, and shows how to use them to link up with another program or system. $24.95.

Animation, Games, and Sound for the IBM Personal Computer, by Tony Fabbri. Learn Basic statements and programming while creating "arcade" games on the pc. Requires no prior knowledge of computers or programming and no special graphics equipment (just a 32K memory and at least one disk drive). $16.95.

Conversion Handbook of BASIC, by J. Mel Harris and Michael L. Scofield. $14.95.

BASIC for the IBM Personal Computer, by D. Heiserman. $15.95.

Programmed Press
Elmont, NY

Computer-Assisted Investment Handbook (Bookbinder). Fifty programs: stocks, bonds, options, futures, foreign exchange, and statistical package. $19.95.

QED Information Sciences, Inc.
Wellesley, MA

Microcomputer Software Selection Guide. Down-to-earth tutorial shows managers what to look for in microcomputer software and how to avoid common pitfalls in software selection. $14.95.

Learning to Use the IBM Personal Computer. This guide is a hands-on tutorial for the first-time user. Solve business problems without wading through reams of documentation. $14.95.

Reston Publishing Co.
Reston, VA

Better BASIC for the IBM PC, by J.N.P. Hume and R. C. Holt. A complete guide to programming in Basic for the pc. Uses extensions to Basic provided only on the pc to write structured programs. An excellent grounding for further study in computer science or a step-by-step guide for self-learning. Nonmathematical in orientation. $16.95.

The DIF Files, by Donald H. Beil. This book looks at the wide variety of potentially unassociated software currently available. It offers extended case studies that demonstrate data exchange between some of the most popular of those software products. This book contains information for anyone who uses one of the products that support DIF and who wants to interchange data with other products that support DIF. Paper, $15.95. Cloth, $19.95.

The VisiCalc Book: IBM Edition, Donald H. Beil. Hundreds of pc users and businesses have discovered the wide range of uses for *VisiCalc.* This book describes model building, entering data, and explores the "what if" questions about profit/loss projections, pricing/costing estimates, or any other aspects of running a business. Many practice problems are included. Paper, $16. Cloth, $20.

IBM BASIC for Business and Home, by Robert Funkhouser. Explores DOS, writing programs, creating data files. Contains practical, instructive program models. Explains how to write programs to fit specific needs. Analyzes and designs an application from scratch with documentation instructions. Paper, $14.95. Cloth, $19.95.

Executive's Guide to the IBM Personal Computer, by Alan Parker. Available at most computer stores or order directly from the publisher. This loose-leaf binder comes complete with two disks in a sturdy, leatherlike slipcase. For the novice pc user or executive who does not have time for a computer course. $49.95.

Howard W. Sams & Co., Inc.
Indianapolis, IN

Interfacing to the IBM Personal Computer, by Lewis C. Eggbrecht. Written by the lead designer and architect of the IBM pc itself, this authoritative, single-volume presentation gives detailed technical data and operational theory for interfacing the pc with a variety of hardware and software. Includes design tips and examples, the operational "whys," many 8088/8086 ASM subroutines for interfacing, and Basic programs as examples of functions. $17.95.

The PC DOS Companion, by Stephen Murtha and Gup Petrie. An illustrated introduction to all versions of PC-DOS including 1.0, 1.1, and 2.0, for users of the pc and XT. After a brief general background, PC-DOS commands and pc hardware/software/DOS relationships are covered in full detail. Includes tips for most effectively using each command, a removable reference card of commands, and more. $15.95.

Word Processing on the IBM Personal Computer, by Danny Goodman. Tells about configuring your pc system to do word processing, the advantages and disadvantages of pc hardware, and a major analysis of fifteen word-processing packages for the pc, including program changes, ("patches") you can make to improve a package's flexibility or ease of operation. $19.95.

Mostly Basic: Applications for your IBM PC, Book 1, by Howard Berenbon. Thirty-eight chapters filled with useful and entertaining Basic programs for home and office. Programs include energy usage, business bar-chart, dialing the telephone, learning a foreign language, and more. On the entertainment side, there's an electronic harpsichord, a tarot card reader, and a two-level math dungeon, among others. All programs are in IBM Basic, and are fully tested and debugged. $12.95.

Seybold Publications, Inc.
Media, PA

The Seybold Report on Professional Computing. Newsletter, no advertising, evaluating integrated decision support and managerial software packages, text editing, and so on. Industry news selected for relevance to professional users of microcomputers. Monthly, $96 per year.

SOFTwareHOUSE International
Menomonie, WI

Softwarehouse International. A discount club for computer software and accessories. Club members pay a one-time fee of $10.00. They receive an 83-page catalogue, several newsletters each year reviewing software and sharing information. Members also can ask for advice or suggestions.

Sybex, Inc.
Berkeley, CA

Programming the 8086/8088, by James W. Coffron. Learn how to program the most widely used sixteen-bit microprocessors in industry today—the 8086 and the 8088. $14.95.

The IBM PC Connection, by James W. Coffron. Learn the simple techniques for putting your pc to work controlling external devices. Design a computer-controlled burglar alarm system, control lights, electricity, and other noncomputer devices in your home or office. $13.95.

Business Graphics for the IBM PC, by Nelson Ford. Make your presentations and reports more meaningful and easier to understand. Ready-to-run programs allow you to create anything from the simplest line graph to more complex and illustrative graphs. $15.95.

IBM PC DOS Handbook, by Richard Allen King. This introduction to PC-DOS will tell you where to find and how to handle the various part of the DOS and how to adapt your pc to meet specific application needs. $9.95.

Useful BASIC Programs for the IBM PC, by Stanley R. Trost. This collection of practical programs allows you to take full advantage of each one of the pc's functions without ever

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having to create a flowchart or learn a word of Basic. $8.95.

The Best of IBM PC Software, by Stanley R. Trost. Get the best available software for your pc. Software experts review commercially available software for word processing, financial and business analysis, scientific applications, and communications. $9.95.

BASIC Exercises for the IBM Personal Computer, by J. P. Lamoitier. Learn the true style and subtleties of IBM Basic through actual practice. Graduated exercises in math, business, operations research, games, and statistics teach you how to program in Basic. $13.95.

The ABC's of the IBM PC, by Joan Lasselle and Carol Ramsay. Easy to follow, step-by-step instructions guide you through assembling the system components and performing the first of many useful operations. $9.95.

Doing Business with Pascal, by Richard and Douglas Hergert. The power of Pascal can be used to make business more efficient. The first book of its kind, this book explains how to design business systems in Pascal, write practical business programs, and use the powerful Pascal language extensions. $17.95.

Weber Systems, Inc.
Chesterland, OH

IBM PC & XT User's Handbook. A clear, concise, and practical reference guide to the capabilities and operation of the pc and XT. A complete guide to the setup, operations, maintenance, and programming of the pc and XT is included. $15.95.

Widl Video Publications
Chicago, IL

The Blue Book for the IBM Personal Computer. A master directory of software, hardware, and accessories for the pc, XT, and other IBM compatibles. Lists programs in dozens of categories from accounting to word processing. $24.95.

What A Computer Can Do For You. A good explanation of how the computer can be a useful tool. Written in an easy-to-comprehend style with plenty of illustrations and applications ideas for the beginner. $5.95.

The Computers Are Coming. An overall introduction to computing for the lay person. Meant for someone who has heard about computers and needs a simple introduction. Provides a good working knowledge of the effects of computers and their applications. $5.95.

The Easy to Understand Computer Dictionary. Computer terms defined in simple, nontechnical language. Also contains half-page illustrations for each word. Provides a good understanding of the more commonly used terms. $5.95.

Wildfire Publishing Company
Goleta, CA

Your Fortune in the Microcomputer Business. A two-volume set containing all the information needed to establish and maintain a microcomputer business. Volume I shows the practical steps to start your business. Volume II deals with the problems a person faces after his business really takes off. Both volumes, $24.95.

John Wiley & Sons
New York, NY

PC Graphics: Charts, Games, and Art on the IBM PC, by Conklin. A hands-on guide to using the graphic capabilities of the pc. Even computer novices learn to create business charts, engineering data plots, computer art, even arcade games in IBM pc Basic. Numerous examples with detailed commentary and screen photos. $15.95. Accompanying program disk (optional), $24.95.

Stock Selection: Buying and Selling Stocks Using the IBM PC, by Jenks and Jenks. A detailed guide to a professional system of stock analysis to make the most profitable buying and selling decisions. Shows how to sort, track, and analyze up to 500 stocks. $17.95. Accompanying program disk (optional), $49.95.

PC DOS: Using the IBM PC Operating System, by Ashley and Fernandez. A self-teaching guide to pc DOS 1.1, teaching, through hundreds of examples and practice exercises, how to use all the functions of this critical program. $14.95.

Window, Inc.
Watertown, MA

Window. A learning magazine on a disk that will be available for the pc in January 1984. Each issue includes a variety of programs, games, interactive reviews, and a feature program, as well as columns on *VisiCalc* and *Logo*. *Window* is published five times per year. Single issue, $24.95. Year's subscription, $95.

Yes!, Inc.
Washington, D.C.

Computers: A Comprehensive Guide. A sixty-four-page annotated mail-order catalogue for the best in microcomputer books. It reviews 819 books chosen to help you make the most of your microcomputer. Topics included in the guide are business applications, assembly language and microprocessors, programming languages, and artificial intelligence, among others. All books included in the guide are available from the Yes! Bookshop through their mail-order service. $2.

SYSTEM SOFTWARE, LANGUAGES, AND UTILITIES

Abacus Data, Inc.
Jacksonville, Fl

Informa 25. Provides the Pascal programmers' interface and runtime modules that give total flexibility for development beyond the structure of *Informa 20* relational database management system. As an upgrade to the *Informa 20*, $200.

Advanced Micro Techniques
Foster City, CA

DPatch. Allows the user to recover data from damaged floppy and hard disks. Provides for complete control by the user. *DPatch* also provides a complete surface analysis of any disk onit and flags I/O errors so that CP/M will not attempt to use the

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faulty areas. *DPatch* allows the user to recover files that have been erased from the disk. $195.

MicroLib. Allows the user to store many files into a single larger file. Once a file is stored in the library, it is managed, updated, and retrieved through simple *MicroLib* commands so that less space is required on disk to contain the same number of files. Also, once a file is placed into a library, *MicroLib* provides two levels of security: password and encryption. $295.

Aguila Corp.
Pepperell, MA

E-Setup. A printer control utility that allows the user to preset print options before using existing software. You can specify print style, line spacing, and paper control from a simple, "plain English" menu without programming control codes or installing additional hardware. Printers supported include IBM, Epson, Okidata, NEC, Gemini, and Prowriter. $34.95.

Ann Arbor Software
Ann Arbor, MI

Textra Jr. Full Screen Text Editor. Use for program editing (Pascal, C, Basic, Assembly), simple document preparation, *dBase II* programming. Edit *SuperCalc*, Lotus 1-2-3 files. Documentation includes text tutorial, 100-page reference manual, and on-line tutorial. $39.95.

Awareco
Gualala, CA

Active Trace. Includes *Scope* and cross-reference utilities for Basic. Designed for both beginning and advanced programmers. While a Basic program is running, *Scope* shows what line is being executed, what variables and functions are in the line, and what their current values are. *Active Trace*, $79.95. *Scope* separately, $49.95.

Basic Business Software, Inc.
Las Vegas, NV

Screen. A full-screen text editor providing many different types of cursor movement and text processing features, including support for the MicroSoft mouse. $35.

IBM Basic Utilities. A collection of over fifty subroutines written in Basic for doing a variety of tasks. Package includes a full-screen text editor and a complete Basic preprocessor. $95.

Blaise Computing, Inc.
Berkeley, CA

View Manager. A screen-management system developed explicitly for the IBM pc, comprised of four components. *View Screen* is a menu-driven program that allows the interactive creation, change, and field specification of display screens using true screen painter. *View Document* is also a menu-driven system that documents user-developed screens. Database utilities include programs that provide copying capability of the screen databases and other database functions. The programmer uses procedure calls to *View/Library* to access the screen displays in the screen database. Block mode capabilities, help facilities, and complete screen database access are provided. The system, $275. The *View/Library* source code is available for an additional $150.

Blue Water Systems
Oceanside, CA

Expandson. Expands printer capabilities. Used with Epson MX-80/MX-100 or IBM matrix printers with Graftrax plus. *Expandson* provides expanded text, super- and subscripts, italics and compressed print, line graphics, and foreign character set. The IBM Graphics Printer version includes an extensive listing of foreign characters and Greek and math symbols (no italics). Epson, $39. IBM Graphics, $49.

Bourbaki, Inc.
Boise, ID

FunKey. Versatile and economical function key programmer that enables you to assign command strings to your pc's function keys. Saves values in files for future use. $29.95.

1 DIR. Replaces the DOS prompt with an interactive command system that eliminates the need to type commands and filenames on the command line. Easy to use. Enables you to load files and run programs by positioning the file and command cursors and pressing the enter key. $95.

California Software Products, Inc.
Santa Ana, CA

California 10 Pak. A set of ten tools and aids for use by the professional or business programmer. Includes sort, browse, disassembler, file comparison, and memory browse. $100.

Central Point Software
Portland, OR

Copy II PC. Uses all available memory to make reliable backups. Also includes a disk drive speed test to help keep your drives in top running order. $39.95.

Computer Control Systems, Inc.
Largo, FL

FABS/PC. A subroutine that provides rapid access to very large data files. Key sequential, multipath, balanced B-tree structure. Six key files can be opened simultaneously, key file independent of data file. Easy incorporation, excellent error handling. Variable/duplicate keys supported. Comprehensive manual with demo and test programs. $150.

Autosort/86M. A high-speed sort/merge/select module called as a subroutine from IBM Basic, Basic Compiler, Pascal, Fortran, and Cobol. Very fast for large files. Sorts/selects on string, integer, single precision/double precision fields. Sorts on ten keys independently, ascending or descending. Excellent error handling. Easy to incorporate. $150.

Computer Innovations, Inc.
Red Bank, NJ

Ci-C86 C Compiler. Implements the full language and library as specified by Kernighan and Ritchie's *The C Programming Language*. The output is relocatable to 8086/8088 object module. The linker combines object modules with functions from relocatable library to produce native 8086/8088 programs. $395 one-time license fee.

The Computer Workshop, Inc.
Houghton, MI

The Menu Manager. Allows you to execute any function the operating system is capable of performing with a single keystroke. Also, store up to a ten-line descriptive "file card" of information (recalled with a single keystroke to view or modify) for any file on a disk. $110.

Data Base Decisions
Atlanta, GA

The Inside Track. Gives your pc speed and control—read files as fast as DOS, display data faster, load programs faster, control memory use, run any program from your program, and copy-protect your disks. Includes fold-out memory map, too. Disk (sixty-one programs) and manual, $45, plus $2.50 shipping.

Peeks 'n Pokes. A disk with fifty-eight programs (source included) and a thirty-eight page manual that shows you how to use *peek*, *poke*, *inp*, *out*, and DOS/BIOS function calls from high-level languages to enhance your programs and control the pc. $32.50.

Data*Easy Software, Data Consulting Group
Foster City, CA

Menu Design Aid. This utility is designed for flexibility. You can create menus with sophisticated features by following simple instructions. $15.

Programmer Utilities. These utilities can improve your productivity by eliminating time-consuming tasks. You can display, list, or edit by doing little more than keying in the file name. A number of other utility programs are included. $50.

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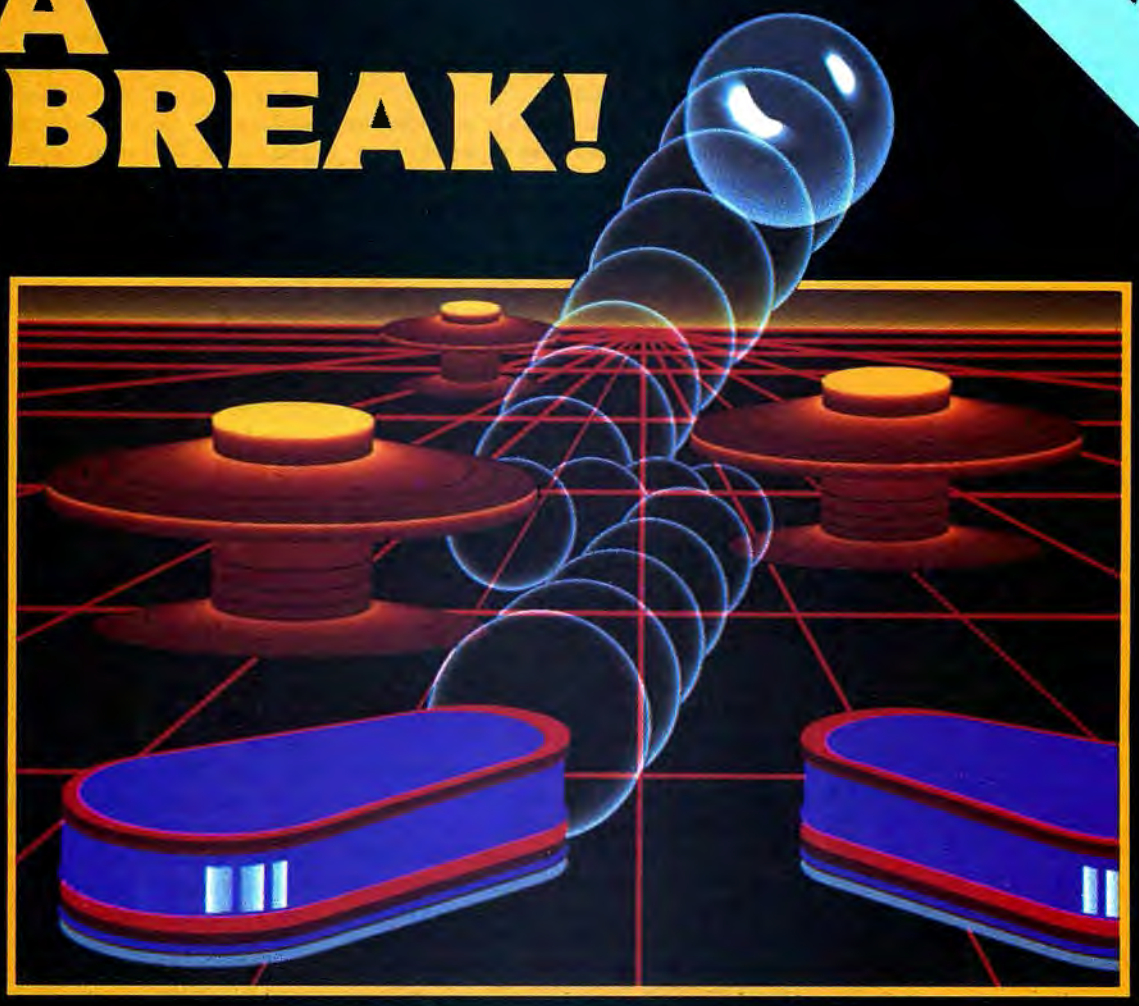

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Screen Design Aid. This screen utility is a quick method of generating screen designs. Simply key in the field titles, their sizes, and enter. The resulting screen and Basic statements are automatically created and saved. $35.

Datatek, Inc.
Clearwater, FL

Datatext. Text editor allows user to input, edit, and manipulate text via a CRT screen. Includes wordwrap, find and replace, horizontal scroll to 255 columns, and help screens at all levels. $175.

Daystar Systems, Inc.
Dallas, TX

UltraFast. A software tool that allows a portion of the pc's RAM memory to emulate up to four double-sided, forty-track disk drives. *UltraFast* allows these four drives to be any combination of physical drives and *UltraFast* emulated drives. *UltraFast* is designed to make use of PC-DOS entirely. No modifications (patches) to PC-DOS 1.1 are required. *UltraFast* is configurable from the keyboard. $39.95.

UltraTrap. A parity error-handling utility program. Intercepts and circumvents the normal parity handler. *UltraTrap* will, for most soft error occurrences, reset the parity error detection circuitry and report the condition to the user via the monitor. The user may then choose to (1) ignore, (2) abort, or (3) reboot the system via a soft boot sequence. $39.95.

Digital Research
Pacific Grove, CA

Concurrent CP/M. Runs up to four separate jobs simultaneously on the pc or XT. $350.

dilithium Press
Beaverton, OR

VisiCalc Worksheets. Book/software package includes thirty-two different worksheets on disk. $34.95.

Distributed Software Systems, Inc.
Northbrook, IL

XF-Dump. A full-screen general purpose utility designed for programmers who may need to display and change the contents of existing files. It is capable of handling all known file structures and absolute sectors on a disk, displaying the data in both its character and hexadecimal representation. $35.

Dynacomp, Inc.
Rochester, NY

Basic Scientific Subroutines, Volume I, by F. Ruckdeschel. The first in a series of books designed to provide microcomputer users with scientific routines written in Basic. These subroutines have been designed to facilitate the application of microcomputers to scientific tasks that have previously been largely in the domain of the large timeshare mainframe computers. $44.95.

Data Smoother. This package provides the user with a fast and easy means to least-squares smooth equally spaced data and plot the results. Any size data set may be treated within the memory limits. The variation in each data point is smoothed according to the weighted average of the points surrounding it. The averaging span is three to twenty-five points. The order of the local smoothing is linear to quintic (first to fifth degree polynomial). Also calculated are the smoothed first and second derivatives of the data at each point. $23.95.

Digital Filter. A comprehensive data processing program that permits the user to design his own filter function or choose from a menu of filter forms. The filter forms are subsequently converted into nonrecursive convolution coefficients that permit rapid data processing in the explicit design mode; the shape of the frequency transfer function is specified by directly entering points along the desired filter curve. $53.95.

Fourier Analyzer. A scientific program that can be applied to examine the frequency spectrum characteristics of defined duration signals, such as groups of pulses. The user inputs a data set that is Fourier transformed into the frequency space descriptors of amplitude and phase. The amplitude and phase results are displayed in tabular form. The input data and calculated results may also be plotted at the user's option. $23.95.

Harmonic Analyzer. The third in Dynacomp's series of Fourier transform software packages. Whereas *Fourier Analyzer* and *Transfer Function Analyzer* were designed with limited duration signals in mind, *Harmonic Analyzer* is specific to repetitive wave forms (cyclic processes). $33.95.

Stattest. Performs statistical tests of hypotheses and includes t-tests, chi-square tests, and F-tests as well as simple regression and a random number generator. $33.95.

Ellis Computing, Inc.
San Francisco, CA

Nevada Edit. CP/M based, character-oriented, full-screen, video text editor, designed for computer program text preparation. Includes single key commands for cursor control, scrolling, block-moves, search and replace, customizable tab stops, and default-file type menu selection. Easily configured to most terminals. $29.95.

Nevada Fortran. Based on the ANSI-66 standards. Popular extensions include if-then-else constructs, trace-style debugging, copy statement, arrays up to seven dimensions, and random access file support. A fast, high-performance compiler, it generates 8080 machine language on all CP/M-based systems with 48K RAM. $29.95.

Nevada Pilot (Programmed, Inquiry, Learning, or Teaching). A string-oriented language, designed for interactive applications such as data entry, programmed instruction, and testing, with an integrated fullscreen text editor and commands to drive optional equipment. Meets the Pilot-73 standards for compatibility with older versions. $29.95.

Ensign Software
Boise, ID

Electronic Disk. Creates the equivalent of a disk drive in your extra RAM memory. Also includes a print spooler that frees the computer for concurrent use while printing is taking place. 96K minimum, one disk drive, either display, DOS 1.1 or DOS 2.0. $49.95.

ISAM Routines. ISAM (Indexed Sequential Access Method) provides keyed access to data files for reading, writing, updating, and deleting records within the files. Browse forward and backward in key sequence. Update any part of the record, including the key. Routines accessed from any Basic application. 48K, one disk drive, any display, DOS. $69.95.

Fast Sort. This machine language sort routine is for use with Basic programs. It will sort any array into ascending or descending order. Sorts variable length strings, fixed length strings, integers, single precision, and double precision arrays. 48K, one disk drive, either display, DOS, disk Basic, $24.95.

Fox & Geller, Inc.
Elmwood Park, NJ

dUtil. A utility that performs a variety of functions for users of Ashton-Tate's *dBase II.* These include syntax checking, increased speed, documentation, and program implementation. $99.

Frontier Technologies
Milwaukee, WI

I/O Test. Tell the program what addresses to check and the program shows you the results. This program can check printer, RS-232C, and real time clock interfaces (as well as any other interface in the I/O channel). $30.

RS-232Test. Checks out your RS-232C interfaces. It works with both COM1 and COM2. The program includes a plug to install onto your interface during testing. The program checks your RS-232C up to baud rates of 9600. $30.

PrinTest. Will check your printer interface for malfunctions. It will work with LPT1, LPT2, and LPT3. The program finds which of these printers is in your computer and checks it. $25.

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MemTest. Will check the memory functions on any IBM expansion board (FTCs or others). The program will check up to 1 megabyte of RAM on your computer. The program can also check to RAM memory in the IBM monochrome or color/graphic board. This is the ideal tool for memory board manufacturers as well as end users. $25.

Print Spooler. Allows printing to become a background function. The program allows the user to choose the size of the buffer, which one or up to all three printers should be spooled, and parallel or serial printing. $70.

RTC, Real Time Clock Controller. Initialize and read the date and time from the real time clock option on Frontier Technologies Memory, Advanced Communications, and IEEE-488 controller boards. The program can be used from PC-DOS as well as Basic. $25.

Gryphon Microproducts
Silver Spring, MD

dBRx. Adds mathematical, statistical, and string functions to *dBase II*—exponentiation, square root, log, and trig functions with precision from seven to nine digits. Also includes btrim, pack and nospace string functions. Written in machine language and *dBase* code. Compatible with dB/R-A. $150.

The Array Program, dB/R-A. Allows *dBase II* to use up to ten three-dimensional arrays of numeric, character, and logical data. Can be used to expand the number of memory variables from 63 to over 65,000. Written entirely in 8088 machine language, fast and easy to use. 128K memory recommended. $200.

Harper Business Systems
Bellevue, WA

HBSort. A standalone (original file in/sorted file out) disk sort. It is simple enough to be used by a novice programmer. *The HBSort Book* contains many helpful programming tips. *HBSort* sorts fixed format records up to 1020 bytes in length and supports complex user-constructed sort keys. Files with up to 2500 records can be sorted. $32.50 (includes *HBSnoop*).

HBSnoop. A tool that prints out the contents of direct disk files—all the records or just selected records, the whole record or just selected fields. *HBSnoop* eliminates the need to write file debugging programs. $32.50 (includes *HBSort*).

Hi Tech Computer Services
Fairfield, CT

The Pascal Toolkit. Gives you four MS-DOS Pascal units, including a complete turtle graphics implementation, console control (keyboard and text screen), complete serial communications support and printer control. Examples show you how to use package to add full screen data input, menu selection, and graph drawing to your programs. Batch programs provided to install package. $150.

Scientific Support Package. Includes units that perform complex math, matrix math, and vector math. Also six statistical distributions, spline, regression, smoothing, equation solving, and sorting as well as a library of often-used mathematical functions. Package contains fifty-five procedures that are easily added to your MS-DOS Pascal programs. $95.

Info-Pros, Inc.
Irvine, CA

Info-Reports. A flexible report writer that uses existing data files to produce comprehensive, cosmetically pleasing reports and forms. A printer spacing chart is shown on the display screen, allowing the user to position each field and define its contents exactly as required. Data from up to four files can be combined into a single report. $125.

Info-Sort. A fast, high-performance sort/select program designed to be used as a standalone utility or to be interfaced with existing applications. *Info-Sort* will quickly sort your data records into whatever sequence you desire. It can read and sort 1000 records on a six-byte string key and create an index file in ten seconds or less. $95.

Information Access Corp.
Shalimar, FL

D2Form. Forms generator allows you to create data-entry forms on your CRT. Each field, its length, and mapped location are stored automatically in a file. This information can be recalled by your own programs, without using data statements. Forms are easily updated. Menu driven. Documentation included. $45.

D2BAKRST. Files stored on a hard disk can be copied (backed up) onto floppy disks with this program even when the file size exceeds a single floppy's capacity. Built-in help screens and documentation are included. Files can be restored to the hard disk with ease. $35.

International Software Alliance
Santa Barbara, CA

Btrieve. A powerful record-management system designed for applications programmers. *Btrieve* builds files based on B-tree structures and allows for both random and sequential keyed access to records in a database. *Btrieve* itself requires 10K of memory and supports applications written in IBM Basic or IBM Pascal. Utilities and samples provided. $195.

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Saginaw, MI

One-Key Step-Scroll. An enhancement for the Basic List command. This subroutine will step forward, backward, or relist the same statements. Two windows, mono and color, 40 to 80 columns, all versions of DOS-Basic, no reduction of user memory. Displays disk-files, memory, variables, and sorted directory. Renum enhancement. $20.

Johnson Associates Software, Inc.
Redding, CA

ISAM 300. Index Sequential Access Method for Basic, Pascal, C, and assembly language programmers. This machine language implementation of ISAM provides extremely high performance. Access time to any record on an eight megabyte file is less than one second. *ISAM 300* provides automatic recovery of deleted space. Index only structures for secondary key access; get previous and third level of index for high performance access to large files. $190.

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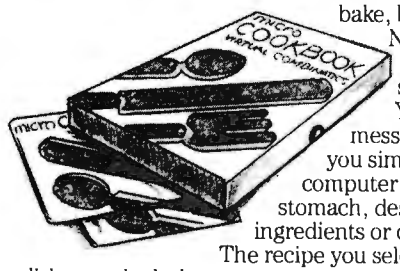

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With this in mind, is it any wonder Micro Cookbook makes this guy so nervous?

Versions available for Apple II+, IIe (80 col) and IBM PC (64K, PC DOS). The cost $40. Advanced Functions Package (requires Micro Cookbook) for IBM PC (128K, PC DOS or MS DOS) and Apple II+, IIe (64K, 80 col). The cost $30. Soups & Salads, Appetizers, or Dessert options, $12 each. Check your dealer first. MC/VISA check, phone or mail order accepted. Please specify computer and add $2 handling.

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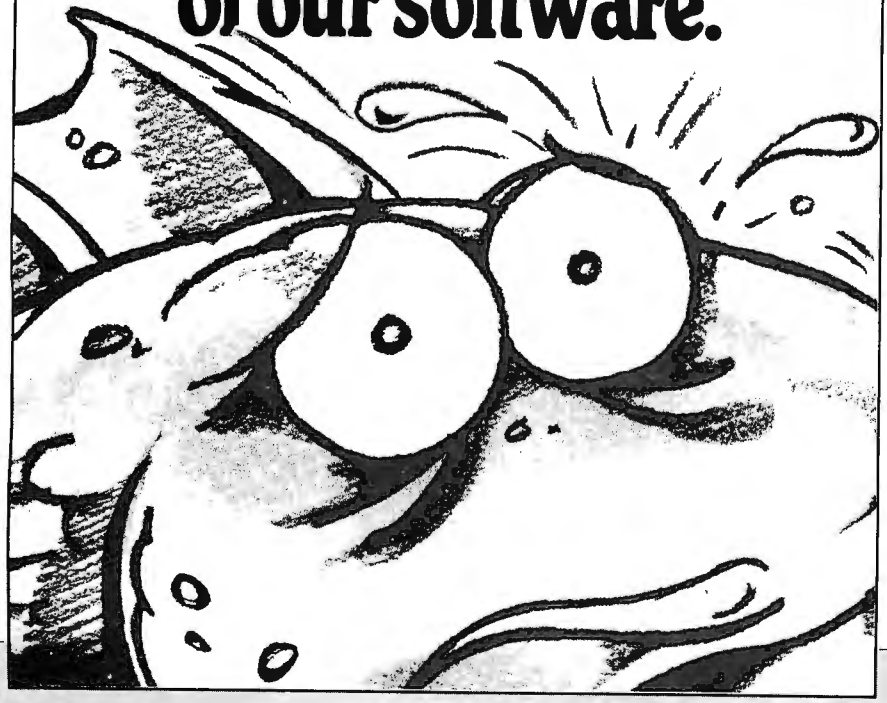
VIRTUAL COMBINATICS
P.O. Box 755, Rockport, MA 01966
(617) 546-6553

Why fish are terrified of our software.



DE 200. This set of subroutines can be added to your application program to both simplify the programming and improve operational characteristics of keyboard data entry. A data entry form is drawn on the display screen. The resulting picture is stored on disk. The subroutines use this form as the only program necessary to control the application-keyed data entry. After the complete screen of data has been entered, the system pauses for visual verification of the data. If corrections are necessary, keying the field number allows that single field to be reentered. The enter key releases the data for the application program to process. $80.

Jupiter Island Corp.
Emeryville, CA

ColorText. Accesses the capabilities of the IDS Prism printers without programming: more than twenty-one colors, six type sizes, foreign language characters, proportional type, many text formatting features. Fifty-three commands. $149.

Krown Computing
Scotts Valley, CA

The Last One. A code generator accepting plain English commands from diversified menus translates into cost reduction. Produces error-free, ready-to-use programs in Basic. Tailor-made in-house modification capability. $495.

Laboratory Microsystems, Inc.
Los Angeles, CA

PC/Forth. A complete programming package including interpreter/compiler, assembler, full screen editor, and many utilities. Extensions available include 8087 support, cross computers, advanced color graphics, modem control, and custom character set generator. Prices start at $100.

Learning Tools
Cambridge, MA

SoftDoc. A flexible, general-purpose on-line documentation system for UCSD Pascal software developers who want to provide on-line support to their users. As part of a UCSD Pascal application program, *SoftDoc* provides on-line user access to tutorials or technical information. When users have a question, *SofDoc* can give them immediate answers. Using single-key commands users can easily locate specific information, browse through documentation, and display indexed information. $395, plus royalties.

Logitech, Inc.
Palo Alto, CA

Modula-2/86. A complete development system for programming 8086/8088-based microcomputer in the *Modula-2* language. It is available for CP/M-86 and PC-DOS. The

UTILITIES

Modula-2/86 package includes a compiler, linker, symbolic debugger, module library, user manual, and the book *Programming in Modula-2*, by Niklaus Wirth. The compiler translates standard *Modula-2* source to ROMable native machine code. $495.

MicroMatch
Tujunga, CA

Memory Test Diagnostic Program. $24.95.

Microrim, Inc.
Bellevue, WA

Extended Report Writer. Generates complex and detailed reports from database files. It can retrieve data from multiple files, change uppercase to lowercase (and vice versa), conditionally print reports from within another report, and define masks to align columns on the decimal point. $150.

Microtech Exports, Inc.
Palo Alto, CA

Reformatter. This software allows pc users to exchange data files and/or source code with IBM mainframes or other mainframes that read the IBM 3740 format. An enhanced user interface makes it easy to operate and provides control over IBM 3740 file parameters. Requires one eight-in. add-on floppy disk drive. $350.

MicroWare, Inc.
Kingston, MA

87Pascal/RTOS. The MicroWare configured version of the Intel Pascal compiler is the most powerful compiler available to pc users at this time. It is an ISO-Standard Pascal, with 8087-8088 exceptions. These make it possible to use all the 8087 data types directly, while generating modules in one of the three Intel memory models. $1,350.

87Fortran/RTOS. An adaptation of the Intel Fortran-86 ANSI-77 compiler. Generates 8087 code allowing use of all 8087 data types. The complete subset I/O is supported. Also allows overlays and 832K addressing. *87Fortran/RTOS* is ideal for large, number-intensive or control-hardware applications. RTOS-real time operating system is included. $1,350.

Matrixpak. Written in assembly language, this runtime package accurately manipulates large matrices at very fast speeds. Includes matrix inversion and the solution of simultaneous linear equations. Callable from MS Fortran 3.13, MS Pascal 3.13, SSS Fortran, and MicroWare 87Macro, 87Basic, and RTOS compilers. $150 per module.

87Basic. A set of patches to the IBM Basic compiler and its two libraries Bascom.lib and Basrun.exe. These give the user total and transparent 8087 support. Included is addition, subtraction, multiplication and division, trigonometrics and transcendentals, hyperbolics, and encoding and decoding. It will speed up compiled Basic programs by factors of five to fifteen. $150.

Morgan Computing Co.
Dallas, TX

Trace86. Runs programs at slow speed while displaying, all on one screen, an assembly version of a compiled program, the machine registers, and data in memory. It provides general utility and memory manipulation functions including changes (words, bytes, or blocks), moves, pattern search, and block comparison. Also allows for extensive examination of and changes to memory and disk files. Requires 128K. $125.

Ted. A programmer's text editor on source and data (ASCII) files, with full screen and cursor control. Features include programmable function keys, a powerful macro capability, column reference indicator, and manipulation features: move, copy, locate, and merge files or designated lines of code. Requires 128K. $95.

Copy Protector. A software utility that prevents the unauthorized duplication of programs. The normal use of *copy* and *diskcopy* commands to duplicate program disks is rendered ineffective. Requires 64K. $95.

Mountain View Press, Inc.
Mountain View, CA

MVP-FORTH PADS Professional applications development systems. Includes public domain source and complete instructions for program development. $400.

MVP-FORTH Programmer's Kit. A complete public domain version of the Forth computer language including disks, user's manual, and reference books. $150.

Network Consulting, Inc.
Burnaby, BC, Canada

Practical UCSD Pascal. Includes a Pascal compiler combined with the fast p-System operating system and a special guide that clearly describes how to begin programming with the p-System. $295.

Coherent. Provides the multiuser, multitasking programming capabilities of a mainframe on a microcomputer. It is compatible with Unix 7 and offers more than 150 of that system's commands. Because it was independently developed, *Coherent* is half the cost of comparable systems. $645.

p-System Operating System. Runs 1.5 to 5 times faster than the IBM version. A complete development system compatible with many pc lookalikes, it includes a screen editor, file manager, RAM disk support, dynamic memory allocation, and a print buffer. $795.

Norell Data Systems Corp.
Los Angeles, CA

Disk Magic. A disk dump and patch utility that lets the computer user get at the bits. Provides many powerful features, yet combines menu control with two-dimensional screen interaction. Full-screen display of disk records by absolute sector number or by file sector allocation is supported, along with alternate sector sizes. Program will display disk data in ASCII and hex, and the cursor can be positioned using the cursor control keys to change any byte. A comprehensive manual, containing many introductory lessons to DOS file-allocation methods, is included. $49.95.

QBasic Pre-Processor. QBasic solves Basic problems by performing symbolic label processing; formatted program listing with page numbers, titles, subtitles, time, and date. Program permits the inclusion of library routines with the ability to replace strings of text within the included block and to support local labels; and cross-reference listing of all program labels. $49.95.

Autodoc Basic Utility. A series of optimization routines that complements the development, maintenance, and use of application programs written using the pc's Basic language interpreter. A cross-reference utility allows the printing of variable and line-number usage, *Goto* and *Gosub* statement reference listing, and the generation of a revised copy of the source program file with all remark statements deleted. A dynamic symbol table processor identifies the order that variables are entered into the symbol table, thus making it highly useful in the determination of program execution speed improvement. A Basic program-compare utility allows the programmer to determine line differences between two versions of a program. These three utilities augment a Basic programmer's tool kit. $49.95.

Pack & Crypt. A three-program package designed to save disk space and to provide security to sensitive data. Pack uses Huffman coding to compress files, saving 20 percent to 60 percent on text and program source files. *Crypt* takes a user-provided password and employs a sophisticated Payne-Lewis-Tausworth-based cipher algorithm to encrypt the data and to protect the file against unauthorized readers. The third program in the package, *Hexer,* allows you to convert any *Packed* or *Crypted* file into a form suitable for transmission through a communications link. $49.95.

Lisp/88. An interpreter for *Lisp*, a programming language widely used in artificial intelligence experimentation. Includes more than seventy-five built-in functions and offers the essential Lisp data structures and functions, including sixteen-bit integer arithmetic, list operations, recursion, string operations, file

UTILITIES

I/O, and garbage collection for automatic reuse of memory. A simple editor and file package, written in Lisp, is included with the software package. This allows editing Lisp function definitions and saving them on disk. Debugging aids included in the package are trace and optional break on errors. $49.95.

Personal Computer Products
Santa Clara, CA

Serial Printer Program. Allows the pc to send files to a serial printer. It supports line widths, basic formatting, paging, form handling, and filename/date/time stamping. Included is a manual and a translation table for customization. Supported baud rates are 75 to 9600. $69.95.

Peter Norton Computing
Santa Monica, CA

The Norton Utilities. A powerful supplement to DOS, providing file recovery, disk exploration, screen control, and other functions. $80.

Access Tools for the IBM/PC. Provides a set of assembly language subroutines to give your programs, in Basic and other languages, access to all the ROM-BIOS routines.$80 including the accompanying book.

Opt-Tech Data Processing
Huble, TX

Opt-Tech Sort. A high-speed general purpose sort/merge utility for the pc-compatible systems. It features the ability to process fixed or variable length records on up to nine keys. There is no limit to the size or the number of records that can be processed. *Opt-Tech Sort* can be used as a DOS command or as a subroutine. $75.

Persyst
Irvine, CA

PC/Format. An interactive screen formatter designed to simplify the programmer's task of defining professional screen displays while controlling and editing keyboard data entry. $125.

Insta-Drive 3.00. Improves the execution speed of programs by allowing users to add up to four disk emulators with storage capacities ranging from 32 to 360K. $50.

Wait-Less Printing 3.00. Spool program makes it possible for users to continue working with their pc at the same time data are being printed. $50.

Port-A-Soft
Orem, UT

Disk Format Conversion/Downloading Service. Convert to/from over sixty disk formats including various IBM and Apple disk formats. Call for price.

ProActive Systems Corp.
Palo Alto, CA

ProSort. A tree-insertion sort written in Pascal. It reads and merges up to eight files, extracting desired records, sorting them, and writing them to an output file. Batch mode or interactive mode; no limit on specifications or number of data records. $75, including source code and documentation.

Prodata, Inc.
Boise, ID

KSAM. Allows keyed data files in Basic. Partial key look-up, duplicate keys, multiple key files (read-only) allowed. Key can be 249 bytes; data can be up to 32K bytes. Disk-based keys minimize memory requirements for large files (e.g., hard disk). Includes key build utility. $69.95.

EasyScreen. Allows screen design by drawing right on the video screen. Can automatically generate a Basic program to allow using the screen in block mode for updating a keyed file (KSAM product included). Also includes hardcopy listing utilities. $169.95.

Quest Research, Inc.
Huntsville, AL

Forth-32. Complete software development system allows programming over the entire megabyte of memory addressable by the 8086/8088 microprocessor. Programs can be larger than 64K. Unique segment-sensing compiler keeps track of CPU memory management. Accompanied by its own screen editor, assembler, structured decompiler, symbolic debugger, and graphics. $195.

8087 Floating Point Extension for Forth-32. Full set of floating point operators, transcendental functions, random number generator, full error checking. Software emulation also available. $95.

Software Floating Point Extension for Forth-32. Full set of floating point operators, transcendental functions, random number generator, full error checking. Full emulation of 8087 floating point extension. $95.

DiskPak Utilities. Collection of disk utilities for the pc and compatibles. Allow recovery of files on disks whose directories are damaged, allow recovery of erased files, display of disk sectors, and direct editing of disk sectors. $60.

Big Buf Utility. Increases the size of the keyboard typeahead buffer to a maximum of 132 characters. This enables the user to type ahead while the computer is performing another task. $45.

Edlin Recovery Utility. Permits recovery of a file lost during an Edlin edit session. For example, if the disk was full on exit, then Edlin will be unable to save the file onto the disk. $35.

ReadiWare Systems
W. Redding, CT

ReadiScope. A comprehensive diagnostic program that analyzes the current status of a disk drive. A drive can be tested in seconds without removal. Adjustments to head, spindle, hub alignment, and rotational speed can be made in minutes without special equipment or skills. Comes complete with special diagnostic disk. $295.

Rogue River Software
Medford, Oregon

SPF/PC. A full-screen text editor specifically written to take advantage of advanced features on the pc. It looks and works like the IBM mainframe SPF editor. Display can be monochrome, black and white, or color if using the color graphics board. *SPF/PC* can use over 700K for workspace if available. *SPF/PC* is written entirely in machine language for speed and efficiency. Requires 128K. $149.95.

RoseSoft, Inc.
Seattle, WA

ProKey. A productivity tool with uses that range from the elimination of repetitive typing and the automation of routine tasks to the customization of programs and the creation of turnkey systems without any programming. It gives users access to over 200 function keys and lets them change the positions of keys. $99.95.

Satellite Software International
Orem, UT

SSI ★Forth. A FIG-compatible Forth development system for the pc and other sixteen-bit (8086/88) personal computers. Includes interpreter, compiler, decompiler, editor, text conversion tools, and many other features. Source code is included to facilitate specialized development efforts. $95.

P-Edit. A full-screen text editor intended specifically for the professional programmer. Full implementation of function keys and cursor control keys. File size is limited only by the amount of space on your disk. $95.

SimSoft, Inc.
Port Huron, MI

The Informer. Designed for the DOS 1.0 and 1.1 users who want to know exactly what is on each disk. *The Informer* reads the disk's directory and reports on all files of the disk. Info includes file names, attributes, date/time of last update, where files reside on disk, and its size. Totals for all files are printed or displayed. $40.

Programmers' Tool Kit. Consists of forty-five Basic routines that work together to make programming an easier task. Routines all interact with a screen/keyboard manager. This routine performs all screen displays and keyboard input through easy programmer codes. Keyed input is edited for validity while keying. With seventy-page manual. $70.

Textra™ word processing

The shortest distance between your thoughts and the printed word.

Your thoughts come faster than your words. Capturing them smoothly and quickly is the strength of Textra, and the secret behind its success.

Textra blends advanced features with a simplified design that makes it easier to write with your personal computer. And that's what word processing is all about.

Start with the 'on-line' tutorial, which has been called everything from elegant to excellent. It's the finest introduction to a software program ever filmed. You'll be ready to write in record time.

And Textra will be ready for you. Its highly responsive full screen editor helps you put your thoughts on the screen swiftly. Automatic reformatting and on-screen bolding and underlining show you what your printed text will look like at all times. You can even preview your pages *before* they're printed, so you only have to print them once!

Whether you're searching for your first word processor, or feel miserable with the one you have now, take a close look at Textra. Ask your dealer for a demonstration today.

It's guaranteed to open your eye.

A² Software

Textra runs on the IBM PC and compatibles, and requires PCDOS (any version), 128K, and either monitor. TextraJr. ($39.95) requires 64K.

Ann Arbor Software

407 N. Main, Ann Arbor, MI 48104 Phone (313) 769-9088
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UTILITIES

Smartware
San Francisco, CA

Revelation. A relational database management system with roots in the thirty-two-bit mini world. It utilizes the 8087 math chip to bring new levels of performance and capabilities to the IBM and IBM lookalike machines. LAN support Q1. $84.

SoftCraft Inc.
Austin, TX

Btrieve. A record management system; applications written in Basic, Pascal, Cobol, or C use simple subroutine calls to store and retrieve records by key value. Supports unlimited number of records and up to eight keys per file. Unique data integrity features provided. $145.

SofTech Microsystems, Inc.
San Diego, CA

Edvance. The p-System advanced, menu-driven screen editor. It edits files of unlimited size and features nested editing (the ability to edit more than one file at a time), and macro command functions (the ability to assign many functions to a single keystroke). Combined with p-System print utility, *Edvance* is a text processor. A documentation package is included.

p-System Bootable System. A fully functional operating system designed for text processing and application execution. Combined with a p-System language, the *p-System Bootable System* is also designed as a complete application development system. It includes the screen editor, file manager, application services, printing and configuration utilities, command menu, library manager, p-machine emulator, turtle graphics support, and a documentation package. $250.

UCSD Pascal Compiler. Features the de facto Pascal standard for microcomputers. UCSD Pascal is a fully developed language with extensions for systems development and commercial applications programming. A documentation package is included. $375.

The Assemblers Packages. Native code-generating macro cross-assemblers that allow you to write assembly language programs on the host machine of your choice for the object machine of your choice. *The Assemblers Package* consists of cross-assemblers for the Z-80, 8080, PDP-11/LSI-11, 6502, 6800, 6809, 9900, 8086/8088, and 68000 microprocessors. Requires p-System. $200.

Fortran-77 Compiler. Features an up-to-date ANSI-77 subset with support for structured programming and improved character types. Fortran-77 is fully integrated and compatible with UCSD Pascal and Basic. A documentation package is included. $375.

KSAM. Keyed Sequential Access Method is a programming package that can be incorporated into application programs. It supports sequential and keyed retrieval of data and is designed to help you write programs that require fast access to information. The *KSAM* package also provides utility programs for maintaining a *KSAM*-managed database. A documentation package is included. Requires p-System. $200.

Advanced Development Tool Kit. A collection of programming tools designed for use with the p-System and at least one programming language. The tool kit includes the symbolic debugger, native code generator, assembler, linker, program analysis tools, and a documentation package. $150.

Native Code Generators. Programming performance tools that help tune programs for maximum speed and minimum size by translating selected portions of object code program into the processor's fast-executing native code. Requires p-System. $150.

Softsmith Corporation
San Leandro, CA

Peeks 'n Pokes. No pc can keep a secret from *Peeks 'n Pokes.* You will especially appreciate it if you are developing commercial software. Over fifty programs are available to permit you to read, interpret, change relevant system information. $30.

Character Generator. Create new and exotic alphabets, shapes, or virtually anything that you want. *Character Generator* saves you hours of programming time because you never have to define shapes or characters more than once. Use your creations over and over in many different applications. $24.95.

Software Connections, Inc.
Santa Clara, CA

LAN:DataCore. Multiuser relational database development tool for local area networks. Shortens applications program development time by providing a set of program procedures to handle information storage and retrieval. Specifically designed to provide concurrent data access protection for multicomputer local area networks, data access security for different levels of users, and large capacity (16M database). $645-$1,945.

Soft Warehouse
Honolulu, HI

muLisp-83. A high-performance *Lisp* language pseudo-code compiler and interpreter. *muStar,* the accompanying resident display-oriented editor and debugging facility, eases and speeds program development. Includes reference manual, tutorial, a library of utility functions, and implementations of several game programs. $250.

Software Labs
Sunnyvale, CA

Pascal/MT+ Utilities. Seventy assembly language routines for Pascal/MT+ programs. They control the screen, graphics, music, printers, RS-232 ports, lightpen, joystick, and mouse. SIGGRAPH core's setwindow, setviewport, and clipping, drawing circle/ellipse/pie/line, graphics store/retrieve, animation, menu selection, and full-screen input are included. $119.

Fortran Utilities. Seventy assembly language routines for DOS Fortran programs. They control the screen, graphics, music, printers, RS-232 ports, lightpen, joystick, and mouse. SIGGRAPH core's setwindow, setviewport, and clipping, drawing circle/ellipse/pie/line, graphics store/retrieve, animation, menu selection, and full-screen input are included. $119.

C Utilities. Seventy assembly language routines for Lattice C (Microsoft C) programs. They control the screen, graphics, music, printers, RS-232 ports, lightpen, joystick, and mouse. SIGGRAPH core's setwindow, setviewport, and clipping, drawing circle/ellipse/pie/line, graphics store/retrieve, animation, menu selection, and full-screen input are included. $119.

Pascal Utilities. Seventy assembly language routines for IBM DOS Pascal programs. They control the screen, graphics, music, printers, RS-232 ports, lightpen, joystick, and mouse. SIGGRAPH core's setwindow, setviewport, and clipping, drawing circle/ellipse/pie/line, graphics store/retrieve, animation, menu selection, and full-screen input are included. $119.

Software Technology for Computers, Inc.
Newton, MA

The Creator. An applications designer which produces finished Basic applications programs in the following categories: word processing, financial planning, general ledger, database, mailing list, merge letter, accounts receivable, budgets, bar charts, checkbook, invoicing, music composition, and appointments. Create versatile customizable applications by simply answering English questions. $300.

Solutions, Inc.
Montpelier, VT

Vis/Bridge/Report. Will enhance the printing capability of *VisiCalc.* It allows the user to print variable width columns, align decimal points, center, left or right justify numbers within a column, and automatically segment reports too wide or long for one page. $79.

Vis/Bridge/Sort. Will sort the rows or columns of a *VisiCalc* spreadsheet. Using up to

Proven Performance!

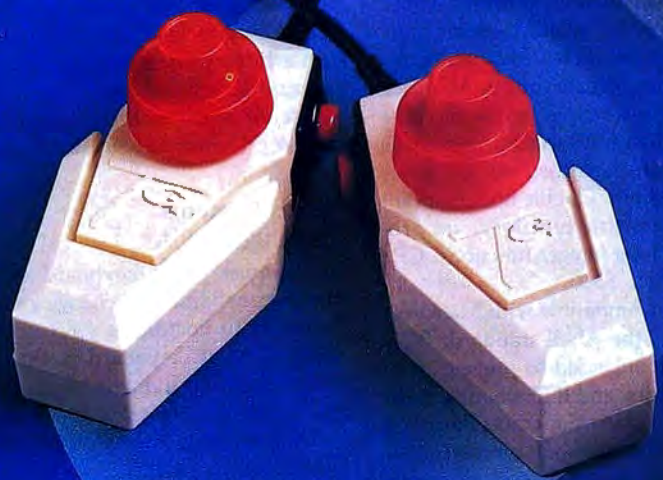
. . . and reliability is what you can depend on from TG Products' game controls. The combination of quality components and unique features produce the precision control you need for exciting game play on personal computers. (Compatible with Apple II, Apple IIe and IBM PC)*

Our confidence in the performance of the game controllers has allowed us to offer a limited **5**ive year warranty for every computer accessory we manufacture. We guarantee five years of trouble-free fun and excitement with every TG game controller you purchase.

TRACK BALL is an omni-directional guidance system for quick response to rapid movement commands and very conducive for use with graphics and educational software applications.

JOYSTICK has completely linear operation, exclusive trim adjustments for both axes and a self-centering feature you may disengage at will.

GAME PADDLES are styled to fit the contours of the hand for smoother simultaneous movement and firing action. They also feature a switchable firing button for right or left handed play.



TG PRODUCTS

These game controls are available at your local dealer or contact:

TG Products
1104 Summit Ave.
Suite 110
Plano, Texas 75074
(214) 424-8568

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UTILITIES

four secondary sorts to break ties, it will sort alphabetically or numerically and in either ascending or descending order. $89.

SolveWare
Redondo Beach, CA

SevenWare. A complete package for addition of the Intel 8087 Numeric Coprocessor to the pc. It includes comprehensive 8087 diagnostics, a unique 8087 demonstration/benchmarking program, and a macro library that adds the 8087 instruction set (with full error-checking) to the IBM *Macro Assembler.* Software, $109. With 8087 chip, $309.

I/O 87. A package of I/O subroutines that greatly aid software development for the Intel 8087 Coprocessor. Four routines are provided: conversion of Basic variables to/from 8087 format, keyboard input to 8087, self-formatting output, and formatted output. An example program is also included. $24.95.

Spectrum Software
Sunnyvale, CA

Micrologic. General purpose electronic logic design and simulation system. Using a built-in graphics design module, a user sketches logic diagrams directly on the screen. A Netlist suitable for simulation is created automatically from the user's drawing. Once the Netlist is prepared, a user may perform timing/state simulation on the Network, represented by the Netlist. The program handles Networks of up to 2,000 gates. $450.

Starside Engineering
Rochester, NY

Compress. A file compression/decompression utility for reducing the size of DOS files. ASCII text files compress to 60 percent of original size. Graphics screen files compress to 25 percent of original size. All machine code and very fast. Compatible with CP/M's SQ/USQ utilities. $22.95, $3 shipping/handling.

StratCom Systems, Inc.
San Diego, CA

PC-Xtract. A software utility for Fortran programmers that scans a single (and potentially large) program source-code file and creates individual source-code files of the main program and each subroutine, function, and blockdata—plus an alphabetized batch file containing the name of each routine that has been extracted for subsequent single-command compilation. $49.

STSC, Inc.
Rockville, MD

*APL *Plus/PC System.* An extended APL language for the pc. The system offers all APL language primitive functions and operators, a simple terminal mode using either the APL or the ASCII character set, and a smart terminal mode for customized intelligent machine interaction. Also includes graphics primitives for the development of business and free-form graphics displays, a full-screen editor, page scrolling, a keyword version for English-like use of APL, an on-line help facility, and the capability to call DOS commands from APL in order to integrate non-APL programs and packages. $595.

*APL *PLUS/PC Financial and Statistical Library.* Contains more than two hundred routines to perform financial calculations, forecast time series, compute statistical measures, and generate probability distribution data. Routines may be used on a standalone basis or may be integrated into other *APL*PLUS* applications on the pc. $275.

SuperSoft, Inc.
Champaign, IL

SuperSoft Fortran. ANSI-66 standard with extensions. The compiler supports many advanced features including complex arithmetic, character variables, and functions. Recursive subroutines with static variables are supported. Also available is *Ratfor,* a preprocessor that compiles to Fortran, allowing the user to write structured code while retaining the benefits of Fortran. *Ratfor* also adds some features of Fortran 77. Requires 128K memory and two disk drives. Fortran, $425; Ratfor, $100; 8087 support, $50.

SuperSoft C. Supports most features of Unix 7 C and produces highly optimized code, making it possible to avoid assembly language coding for most tasks. C is a multipass compiler. The intermediate code is optimized and assembly code is output to disk file. The optimizer typically results in 40 percent code reduction and can be turned off for faster compilation if desired. Double floating point (including trigonometric functions) are provided, as well as long integer functions. CP/M-86 and MS-DOS, $500.

SuperSoft Basic. Compatible with Microsoft Basic and follows the ANSI standard. BCD math routines are included to prevent decimal round-off errors, and IEEE floating point is available as an option. SuperSoft Basic is a true native code compiler, not an intermediate code interpreter. It is a superset of standard Basic, including important features like four variable types (integer, string, and single and double precisioning floating point), long variable name, and print using. 128K required. $300.

SysteMathica
Pittsburgh, PA

PC-DOSX. Speed up disk access and overall execution time by a factor of five to ten times without any hardware modifications. User-friendly self-installed optimizing disk cache with user-selectable cache memory addressing. $99.

Vandata
Seattle, WA

C86 C Compiler. Vandata distributes Computer Innovations' C86 C Compiler. C86 is a full implementation of C as defined by Kernighan and Ritchie's *The C Programming Language.* The library conforms to UNIX 7, and the source to the library is included. No royalty payments are required. $389.

Tall Tree Systems
Palo Alto, CA

Jetdrive. An installable device driver that creates an electronic disk for those who have more than 128K (up to 2.5 megabytes). Restores contents of electronic disk after ctrl-alt-del. Included is *Jet,* a high-speed file transfer program that is ten times faster than the utilities supplied with operating systems for dump/restore contents of hard disk. Delivered with source code. For DOS 2.0. $40.

JFormat. Provides an electronic disk for any system with 128K or more (up to 2.5 megabytes). A formatting routine for eight and ten sectors, on simple dual and quad drives. Also allows 8" drives and most hard disks. A print spooler and a high-speed file transfer program are also included. For DOS 1.1. $60.

Windrive. Available for most Winchester hard disk systems. Source code permits adaptation and customization. All drives will run under DOS 1.1 with *Windrive.* Delivered with source code. $40.

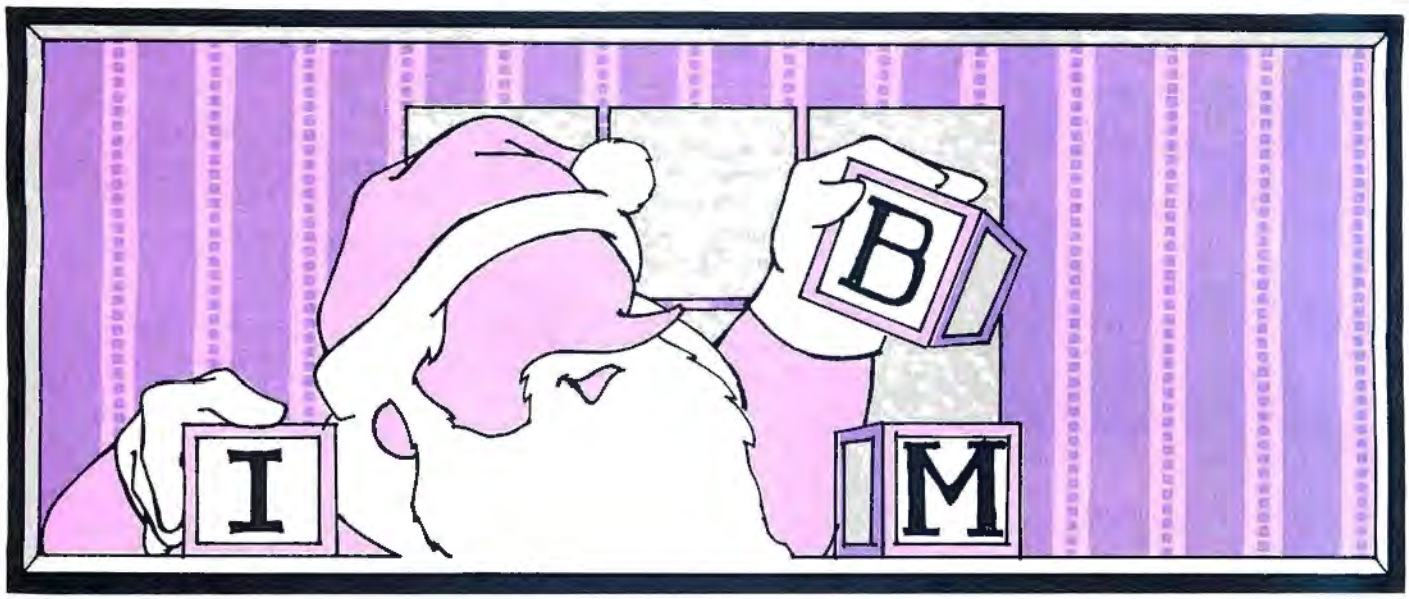
JSpool. Redirectable programmable spooler with arbitrary size buffer using time-slice or interrupt scheduling. Supports both parallel and serial ports with or without *Xon/Xoff* protocol. Delivered with source code. $40.

Vertex Systems
Los Angeles, CA

Keyswapper. Total keyboard control with macro capabilities. Exchange or delete key functions to customize your pc keyboard. Toggle Dvorak keyboard layout on or off. Use cursors and numeric keypad simultaneously. Num lock/caps lock beep signals with activation. Forty macros with version 1.4, $44.95. 300 macros with version 2.0, $79.95.

*Xeno-Copy **. Read and write dozens of different disk formats in your pc or pc-compatible computer with no modems, serial links, or other hardware. Simply place the foreign diskette in your pc's drive and transfer any file instantly. Handles over forty formats, including CP/M, CP/M-86, TRS-DOS and p-System. $149.50.

SoftSpool. The pc runs at 98 percent of regular speed with *Softspool* RAM print spooler. You can purge all or part of the buffer. Parallel or serial, DOS 1.1 or 2.0. $44.95.



WORD PROCESSING

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Cherry Hill, NJ

IBM Word Processing and IBM Business Mass Mailer. Maintains, selectively accesses, sorts, merges, splits mailing list files, and prints out labels, envelopes, mailing lists, and links to *WordStar/MailMerge* for form letters. User-changeable menus and screens. Eleven fields and fourteen category codes/record. Menu-driven. $199.95.

Ann Arbor Software
Ann Arbor, MI

Textra. Features full-screen editing, modeless insert and delete, overstrike, undelete, search, replace, copy, move, merge, extensive reformatting including automatic reformatting, on-screen boldfacing and underlining, full printing, and page preview mode. Documentation includes a 135-page manual and on-line tutorial. $95.

Beaman Porter, Inc.
Harrison, NY

Power Text and *Power Spell.* A sophisticated automatic word processing system for the pc, XT, and IBM lookalikes. Automatically produces headers, footers, closings, cover pages, and tables of contents. True proportional spacing. Supports all printers. *Power Spell* is a spelling checker. *Power Text,* $399. *Power Spell,* $125.

Bruce & James Program Publishers, Inc.
Dublin, OH

Wordvision. A personal writing tool developed for new generation computers. Designed for ease of use at an affordable price. Features include eleven kinds of delete (plus undelete), move or copy marked sections, capitalize or uncapitalize, swap, find and replace, two key phrases, margins, tabs, underline, boldface, single and double space, centering, and super- and subscript. $49.95.

Chang Laboratories, Inc.
San Jose, CA

MemoPlan. A word processor with the ability to work with five documents concurrently. Automatically saves data and can immediately recover deleted data. It also features a split screen for working with two documents simultaneously. Operating systems: CP/M, CP/M-86, MP/M, MS-DOS, PC-DOS. $295.

DocuPlan. A document formatter for complex documents such as manuscripts, technical documentation, legal agreements. Built-in features: automatic table of contents, footnoting, indexing, and legal cross-reference. Operating system: CP/M, CP/M-86, MP/M, MP/M-86, MS-DOS, PC-DOS. $295.

Datatek, Inc.
Clearwater, FL

Datatext. Similar to dedicated word processing systems. Features include proportional spacing with justification and ability to merge *dBase II* documents. $450.

Digital Marketing Corp.
Walnut Creek, CA

Bibliography. Compares citations in a manuscript with entries on a card catalogue and constructs a bibliography of all entries cited. Entries are added to the catalogue using a text editor. Each catalogue entry has a keyname followed by bibliographic information. Entries may be of any length and format. It will work with most word processors including *WordStar, Spellbinder, PeachText,* and *Superwriter.* $125.

Grammatik. Detects grammatical errors as well as other common mistakes not found by most spelling checkers. The *Grammatik* dictionary contains over 500 wordy or misused phrases and 100 gender-specific terms. $75.

Writer's Pack. A collection of five programs for the *WordStar* user: *Proofreader, Grammatik, Footnote, Bibliography,* and *Documate/Plus.* One program guide details all the programs. $295.

Distributed Software Systems, Inc.
Northbrook, IL

Quick-Text. A fully integrated, full screen, menu-oriented word processor and text editor for the casual or business user. Provides all the features required to create, edit, and print documents or files using either *Quick-Text* documents or standard DOS files. $55.

Quick-Text II. A fully integrated, full screen, menu-oriented word processor and text editor. The system provides all the features required to create, edit, and print documents and files; plus it includes wide document support, mail merge, DOS paths, and print from edit. $70.

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Einstein Letter. Offers a practical shortcut in correspondence. Several model letters in a variety of categories to suit every business and personal application are contained in the easy-to-use menu-driven format. Split-screen techniques allow the user to compose from the model letter using the contents outline of the letter's components as a guide. $49.95 to $149.95.

Emerging Technology
Boulder, CO

Edix and *Wordix.* High performance word processor featuring multiple screen windows, multiple text buffers, searching and translating, keystroke macros, on-line help, multicolumn layout, automatic footnotes, section numbering, table of contents, and form letter mailing-list generation. Also available with *Spellix* and *Indix.* $390.

FriendlySoft, Inc.
Arlington, TX

FriendlyWriter with FriendlySpeller. The best little letter writer you ever learned to use in ten minutes, and the only word processor in its price range that has a 50,000-word dictionary/spelling checker. Features single keystroke command and fast performance. $69.95.

Harper Business Systems
Bellevue, WA

Script. Works much like an office typewriter, maintaining close correspondence between the screen and printed text. Format controls are supported by menus. Script uses many type styles. Features include page numbering, headings, justified printing, single keys for reforming paragraphs, centering text, pause/resume, and fixing inset margins. $47.50.

Information Unlimited Software
Sausalito, CA

EasyWriter II. A word processing system that offers standalone word processing functions, features eighty-column display, and stores eighty pages of double-spaced text on a single disk. *EasySpeller* is a spelling-checking for files created with *EasyWriter II* and other DOS files. It recognizes over 88,000 words and allows user to check documents within the *EasyWriter II* editor. Special Webster's Legal and Medical Spellers are available. *EasyWriter II,* $350. *EasySpeller,* $225.

International Software Alliance
Santa Barbara, CA

ProScript Text Formatter. Combine *ProScript Text Formatter* with a text editor such as *Edlin, Vedit,* or *P-Mate,* and you have the capabilities of a full-blown word processor! Twenty-nine print directives give you the control you need to produce professional-looking documents with minimum effort. Automatic section and paragraph numbering and table of contents generation makes it ideal for producing technical manuals. $75.

Lifetree Software, Inc.
Monterey, CA

Volkswriter 1.2. On-screen tutorials, full screen editing, on-screen formatting, standard ASCII files, word processsing, and program editing. $195.

Volkswriter International Edition. Twenty function keys, on-screen tutorials, on-screen format, multilingual word processing, German, French, Spanish, Italian, scientific, and math characters. $225.

Megahaus Corp.
San Diego, CA

MegaWriter. An easy-to-use yet powerful word processing system. Part of a complete family of programs, *MegaWriter* comes complete with mailing list merging and is a sophisticated document filing system. $99.95.

MegaSpell. A spelling checker designed to be used with *MegaWriter. MegaSpell* ignores *MegaWriter* formatting commands, and comes with a 40,000-word dictionary expandable to 50,000 words. $99.95.

Micro Architect Inc.
Burlington, MA

Word-IV. Features automatic line filling; page size, line width, and indent; vertical spacing control; right margin justification; and centering control. $58.

Microsoft Corp.
Bellevue, WA

Microsoft Word. Includes such functional features as multiple windows; special set of preformatted style sheets; capabilities for footnotes, subscripts, and superscripts; glossary buffers; multiple fonts and formats; and horizontal scroll for text wider than the screen. Provision for an electronic mouse for pointing and command execution, an undo command, advanced wordwrap, direct formatting capabilities, and extensive, context-

WORD PROCESSING

sensitive on-line help system. $375 alone. With Microsoft mouse, $475.

Muse Software
Baltimore, MD

Super-Text Professional. Advanced capabilities include eighty-column screen display, on-screen help menus, on-screen formatting, split screen, and easy-to-use text editing features. $99.

Newburyport Computer Associates, Inc.
Newburyport, MA

Swift. Word processor with on-screen merge, bold, underline, centering, mathematical equations, foreign characters, and automatic reformatting. Has no embedded commands, allows unlimited document size, simultaneous printing, user-definable characters, and more. Limited time offer. $149.

Norell Data Systems
Los Angeles, CA

Easyedit. A two-dimensional, cursor-based, full-screen editor that is easy to learn and use. Function keys are used to perform simple editing operations, which are immediately reflected in the file being edited. Bidirectional full search and replace (with prompting, global, and wild card); word wraparound (adjustable left and right margins); line cut and paste; auto indentation; block copy and move; definable macro function keys; boiler plates and side files; split screen editing and dual-file editing; virtual file size. Built-in help menus. $79.95.

Easyproof. A spelling error detection and marking program that is compatible with documents produced by most text editors and word processing systems. Reads a document from a disk file and presents you with a list of words it thinks are incorrect. For each word, you can decide whether to pass it, add it to the dictionary, or mark it as an error in the document. After marking the errors, find and correct the errors using your text editor or word processor. Recognizes more than 50,000 English words. $49.95.

Easytext. Neatly formats documents into pages with space at the top and bottom, even margins, specified headings, and page numbers. It will underline, embolden, center, hyphenate, indent, and overstrike specified words and phrases. Will create a table of contents and help create an index. Form letters, envelopes, and mailing labels can be created. $79.95.

Easyword. Comprises three processing programs—*EasyEdit* text editor, *Easyproof* spelling checker, and *Easytext* format processor. $149.95.

Oak Tree Computing, Inc.
Arcadia, CA

Good-Words. Third-generation word processor. Includes help screens, complete function keys, tutorial. Logical, easily remembered commands, on-screen reminders. Printer and format functions include proportional spacing, complete justification, centering, double height, width, ten fonts, much more. XT version, $149.95. PC version, $99.95.

Oasis Systems
San Diego, CA

The Word Plus. Spelling checker with 45,000+ word dictionary, in-context viewing, lookup, and correction. Package includes utilities for word lists, anagrams, solving crosswords, and much more. Works with most word processors. Available for CP/M-86 and MS-DOS (including 2.0). $150.

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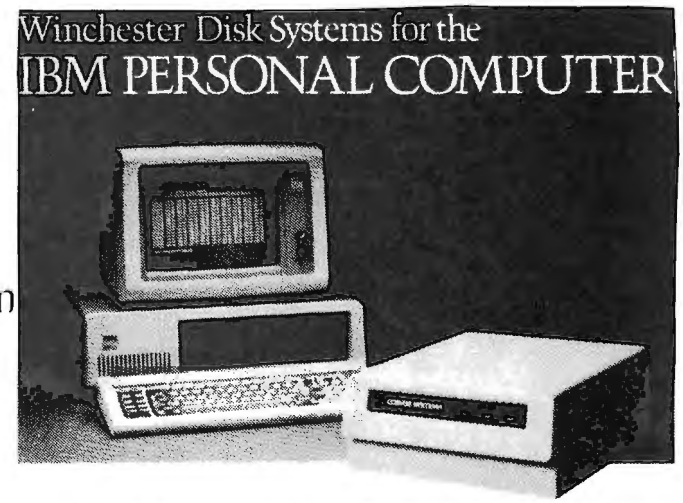

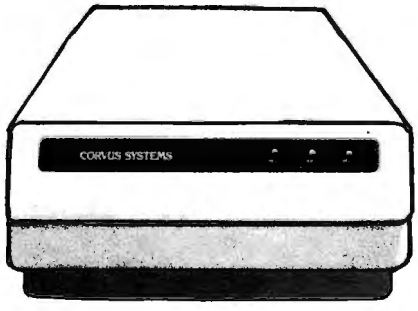

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Sequitur. Integrates a relational database management system and word processor, allowing interactive data editing. Provides a unique visual method of specifying selections, sorts, and joins that allow manipulation without programming. Includes a form generator with complete merging capabilities for form letters and mailing labels, along with a report generator. $795.

Palantir, Inc.
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Palantir. Provides word processing with multiple stored document formats, keystroke glossary, quick pagination, dedicated function keys, multiple headers/footers, extensive help screens. Includes a mailout feature using conditionals, keyboard data entry, and floating point math. $450.

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ReadiWriter. A powerful word formatter based on the GML and Script languages used on large computers. Automatically creates footnotes, tables of contents, lists, and page numbers. Indexes are easily created and maintained. Printer support includes proportional spacing, underlining, italics, boldface, and sub/superscripts. $125.

Satellite Software International
Orem, UT

WordPerfect. A fully featured word processing system. Special features such as speller, math, mailmerge, macros, and footnotes are completely integrated for smooth efficiency. All features are designed to be automatic and effortless. Creating, editing, and printing are done within the same mode. $495.

Personal WordPerfect. Includes the same powerful editing capabilities as *WordPerfect*, but without such advanced features as the speller, mailmerge, footnotes, macros, and math. *Personal WordPerfect* files are compatible with *WordPerfect*. $195.

Select Information Systems
Kentfield, CA

Select. A menu-driven, full-format word processor with single-key commands, a built-in expandable spelling checker, and a merge program for merging information into bills, forms, and mailing lists. *Teach, Select*'s on-screen tutorial, guides the user step-by-step through a series of lessons. $247.

Software Products International, Inc.
San Diego, CA

Word Processing Program. Allows easy creation and editing of text files. In addition to normal insert, delete, and exchange commands, there are commands such as search, search and replace, proportional spacing with justification, copy text from external files while viewing original file, and virtual memory.

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PFS:Write. An easy-to-learn, easy-to-use word processing package that interfaces with the other members of the PFS family and with other popular software programs. In addition to its comprehensive editing functions, *PFS:Write* also allows the user to print personalized form letters from *PFS:File*, to merge *PFS:Report* and *PFS:Graph* output into the body of a *PFS:Write* document, and to merge output from other programs such as *VisiCalc* and Lotus *1-2-3*. $140.

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MultiMate. Word processing software package for the pc and most plug compatibles. Offers eighty functions, a complete user manual including tutorial, and complete dealer and end user support. $495.

State of the Art, Inc.
Costa Mesa, CA

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Symmetric Software, Inc.
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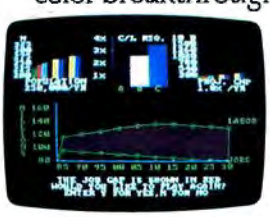

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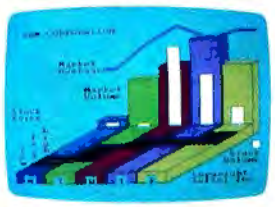

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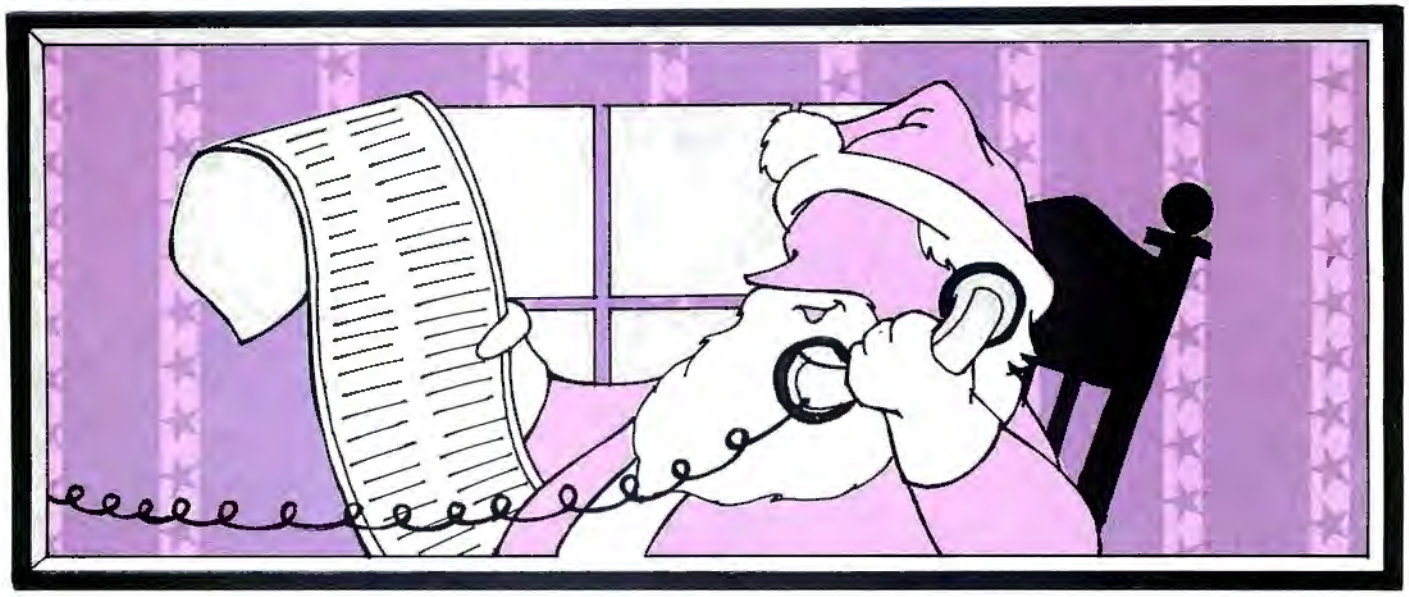

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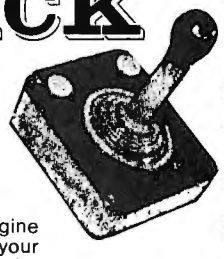

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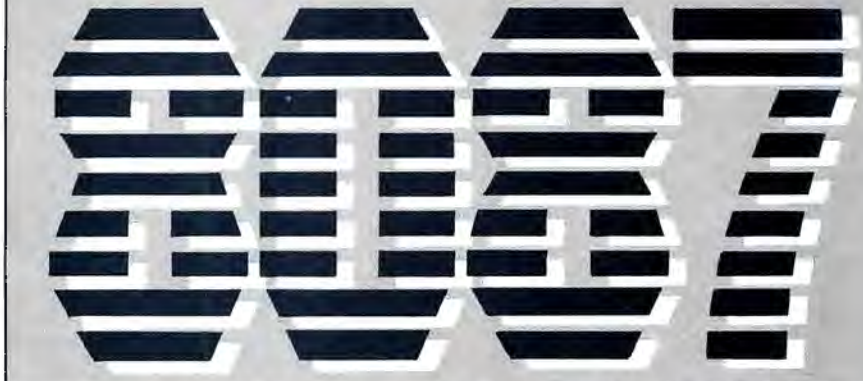

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THE PROFIT PLOT

by Jack Grushcow

This month we'll continue our exploration of the key financial ratios. Having covered the two liquidity ratios last time, we're now ready to move on. The next major group of ratios to discuss are those connected with a company's long-term debt. Later in this installment, we'll consider two other categories of ratio: those related to a company's efficiency and profitability.

The Widget Manufacturing Company balance sheet and income statement from last month are reproduced here for your reference. The examples presented in this installment will use data from these financial statements.

Long-term Debt, Efficiency and Profitability

Analyzing Long-term Debt

The financial ratios in this group are of interest to investors and lenders who are attempting to decide whether a long-term investment in or loan to a company is advisable. The specific ratios that fall into this category are debt to equity, "times interest earned," and asset coverage. These three ratios are useful for determining how easily a company can pay off its long-term debt and for examining its present mix of financing.

Debt/Equity. In addition to generating income through the sale of products and services, a company has two other ways of raising money: It can borrow money and it can issue stock. Borrowing money creates additional debt, while issuing stock creates additional equity. If you can discover how a company mixes these two types of financing, you stand to learn a good deal about how its managers think.

A company that needs to borrow a large sum of money for more than a year's time may issue either a bond or a debenture to raise the required capital. This creates a commitment on the part of the company to repay both principal and interest to the debt holder over a prescribed period of time at a prescribed rate of interest.

A bond pledges specific assets to cover the promise to pay, while a debenture is a loan unsecured by any specific assets. Since most corporate borrowing of this kind takes the form of debentures, the ratios we'll discuss are those that help measure the relative sincerity of a company's promise to pay.

The alternative to borrowing is equity financing. This term refers to capital that has been raised through the issuance of corporate stock. Like borrowing, equity financing is a way for a company to raise money to fund further long-term growth and development.

The two major types of stocks—common and preferred—come in many different varieties, each with its own set of investor-inducing features. Shareholders are actually part owners of the company and participants in its growth. They agree to forego the guarantee of periodic dividend payments in exchange for being allowed to take part in the company's future growth.

A key difference between debt financing and equity financing is that the interest payments on debt must be paid regularly, regardless of how well a company does. Even if a company has several bad years, the interest on its debentures must still be paid or the company can be forced into liquidation.

WIDGET MANUFACTURING COMPANY
Balance Sheet (in thousands)
December 31, 1982

ASSETS		
1. Cash	20,500	
2. Receivables	46,500	
3. Inventory	37,000	
4. Deferred Taxes (current)	6,000	
5. Total Current Assets		110,000
6. Investments	1,000	
7. Property, Plant, and Equipment	298,000	
8. Accumulated Depreciation	201,000	
9. Net Property, Plant, and Equipment	98,000	
10. Goodwill	5,000	
11. Total Assets		213,000
LIABILITIES		
12. Accounts Payable	38,500	
13. Income Tax	11,000	
14. Long-term Debt (due within one year)	3,500	
15. Total Current Liabilities		53,000
16. Long-term Debt	49,000	
17. Deferred Income Tax	11,000	
18. Total Liabilities		113,000
SHAREHOLDERS' EQUITY		
19. Preferred	12,500	
20. Common	54,000	
21. Retained Income	33,500	
22. Total Shareholders' Equity		100,000
23. Total Liabilities and Shareholders' Equity		213,000

Figure 1.

In the case of equity financing, it's up to a company's board of directors to decide whether the common or the preferred shareholders will receive dividends. In years of poor performance, when profits are slim or nonexistent, a company's directors may elect not to pay dividends, retaining company earnings for more urgent requirements. And in some cases, even when performance has been good, a company may

decide not to pay dividends. This can happen when a company expects to need cash for new business expansion or when building a larger cash reserve against anticipated lean times is considered a priority.

In other words, equity capitalization does not necessarily cost the company money year in and year out the way debt capitalization does. This means that equity capitalization does add flexibility to financial planning. But you pay for what you get: Equity capitalization is more expensive to raise than debt.

This brings us to an examination of the debt/equity ratio. The greater the ratio of debt to equity, the greater the risk to the common and preferred shareholders. And when you're deciding whether to become a shareholder in a company, you want to know the degree of risk such an investment would involve.

Debt holders must be paid the interest they're entitled to before the shareholders get dividends. Should a company go under, its debt holders also have prior claim on assets. The larger a company's debt, the smaller the level of protection its shareholders will get should the worst happen. The ratio of debt to equity tells shareholders just how far back in line they stand for company earnings.

WIDGET MANUFACTURING COMPANY
Income Statement (in thousands)
For year ended December 31, 1982

24. Net Sales	249,000	
25. Cost of Goods Sold	215,500	
26. General and Administrative	18,000	
27. Depreciation	3,500	
28. Total Operating Costs		237,000
29. Operating Income	12,000	
30. Interest and Debt Expense	(3,500)	
31. Investment and Other Income	2,500	
32. Income before Taxes		11,000
33. Provision for Income Tax	3,100	
34. Net Income		7,900

Consolidated Statement of Retained Income
For the years ended December 31, 1982

35. Retained Income (beginning)	31,700
36. Net Income	7,900
Dividends	
37. Preferred	800
38. Common (2,500,000 outstanding)	5,300
39. Retained Income	33,500

Figure 2.

In the case of Widget Manufacturing, the following calculation can be made:

Debt/Equity Ratio = Total Long-term Debt / Shareholders' Equity (Book Value)
= Item 16 / Item 22
= 49,000 / 100,000
= 0.5

For a manufacturing company, a debt/equity ratio of 1:1 is considered an upper limit. Widget Manufacturing is comfortably below this suggested maximum.

A company with a high debt/equity ratio has a greater commitment to pay interest charges than one with a lower ratio. In times of economic difficulty, such a company may have its hands full just taking care of interest payments; never mind paying salaries, suppliers, or shareholder dividends.

"Times Interest Earned." The next of the long-term solvency ratios is the times-interest-earned ratio. This ratio indicates how well a company can afford to pay the interest costs on its debt, based on what it earns.

Times Interest Earned = Earnings Before Tax / Interest Charges
= Item 32 / Item 30
= 11,000 / 3,500
= 3.1

According to this calculation, Widget Manufacturing's times-interest-earned ratio is about 3:1. In other words, the company earns three times the amount of interest it needs to service its long-term debt. Manufacturing companies should earn interest payments at least three times over, so Widget's ratio is on the lower end of our range.

The larger the earnings cushion, the safer the lenders' and the shareholders' investments. For a company to merit your serious investment consideration, it should be earning a good deal more than its annual commitment to debt holders.

Asset Coverage. Next on our agenda is the asset coverage ratio. This ratio helps to fill in the long-term solvency picture for the debenture holders and other lenders by indicating the amount of assets that secure a company's long-term debt.

Remember, a debenture is an unsecured loan, backed only by a company's general assets and earning power. Potential lenders need to know what percentage of a company's assets is available to cover the loan.

Asset Coverage = Net Tangible Assets / Long-term Debt
= Item 11 − Item 10 − Item 15 − Item 17 / Item 16
= 213,000 − 5,000 − 53,000 − 11,000 / 49,000
= 144,000 / 49,000
= 2,939

This calculation tells us that for each $1,000 of long-term debt, Widget has $2,939 of assets.

Notice that to calculate net *tangible* assets, we subtract good will, deferred tax, and current liabilities. This gives us a better picture of the true value of the company's available assets. It's pretty hard to sell off a company's good will to cover what may be owed.

The guideline for manufacturing companies is that there should be at least $2,000 worth of assets for each $1,000 worth of long-term debt. Widget again passes inspection, but not by a large margin. As with the other ratios, we'll get better information by comparing Widget to another manufacturer in its own specific industry.

In reviewing Widget's long-term solvency ratios, we noted that both "times interest earned" and asset coverage are close to the suggested limits. We might want to examine the financial condition of its competitors to see whether this is typical for the industry. If not, then Widget's low ratios would provide a focus for further research.

A potential bond holder might well find a more solid-looking investment candidate than Widget. However, it may be that if Widget were to offer a new debenture its new interest rate would be attractive enough to compensate for its slightly higher risk level. This again can be determined only by examination of other companies in the same industry.

Efficiency Ratios

The next set of ratios we'll look at measure management efficiency in certain key areas. The inventory and accounts receivable turnover ratios are important here. We'll also examine the ratio of sales to working capital.

Inventory Turnover. The inventory turnover ratio measures how many times a year a company turns over (sells totally) its current inventory. This ratio provides a good indication of management's ability to design, produce, and market a product that's in demand.

A company with an above-average inventory turnover rate shows a balance between inventory levels and sales volume. This company is less likely to be caught with a backlog of inventory in difficult economic times than a company with a lower inventory turnover rate.

If a company shows a higher inventory turnover ratio than its competition, you can credit management with a superior product mix or excellent sales and marketing departments. These are attributes of an above-average corporation.

A lower-than-average inventory turnover may indicate that a company's inventory contains a large portion of slow-moving or unsalable goods or that poor sales forecasting resulted in overproduction. A company in this position incurs heavy interest and other carrying charges associated with inventories, and these charges eat into profit margins. We discussed the importance of working capital earlier. When a large part of a company's working capital is tied up in inventory, it means that funds are not free for other uses—such as reducing debt, plant expansion, and paying dividends. A comparatively low inventory turnover ratio is cause for concern.

We can determine Widget's inventory turnover rate by means of the following calculation:

Inventory Turnover = Cost of Goods Sold / Inventory
= Item 25 / Item 3
= 215,500 / 37,000
= 5.8

Widget turns over its inventory 5.8 times per year. This inventory turnover can also be expressed in days: 365 / 5.8 = 63 days.

There's no standard yardstick that can be used to evaluate this ratio; it differs too much from one industry to another. Useful insights can be gained only by comparing a company's performance to that of its competitors.

Accounts Receivable Turnover. The next management efficiency ratio we'll consider tells us how rapidly a company is able to turn over—that is, collect—its receivables.

With prevailing interest rates making the financing of receivables so expensive, improving the rate of collections should be a management priority. A long collection period is indicative of a poorly run credit department. The size of the accounts receivable and the quickness with which they are collected also have an important impact on working capital. A longer collection period means that more funds get tied up financing customer purchases and, in addition, the percentage of bad debts begins to increase.

To calculate the accounts receivable ratio for Widget Manufacturing, we proceed as follows:

Accounts Receivable Turnover = (Accounts Receivable * 365) / Sales
= (Item 2 * 365) / Item 24
= (46,500 * 365) / 249,000
= 68 days

Since credit terms differ, this ratio will also vary from one industry to another. Many industrial companies take up to sixty days to collect their accounts receivable. It seems that the Widget Manufacturing takes even longer than this, indicating that there is room for improvement. Obviously, the shorter a company's average collection period, the better.

Sales to Working Capital. The final efficiency ratio we'll look at is computed by dividing sales into working capital. This ratio shows us how well management is making use of working capital; the more effectively working capital is used, the better.

For Widget, the ratio of sales to working capital is:

Sales / Working Capital = Item 24 / (Item 5 − Item 15)
= 249,000 / (110,000 − 53,000)
= 249,000 / 57,000
= 4.4

Each dollar of Widget's working capital can generate $4.40 of sales. When used to compare companies in the same industry, the ratio of sales to working capital can help you spot management that makes the best use of its working capital.

Many efficiency ratios can be applied only to specific industries. If you're a restaurateur, for example, you might want to know how many

times you turn over a table in an evening. If you're the manager of an airline, you might like to know how much revenue is generated for each passenger mile flown; knowing this could help you set more competitive ticket prices. These special efficiency ratios can be very revealing when you're comparing companies. And watch for them in industry reports; they provide valuable clues to good investment opportunities.

Profitability Ratios

The last set of ratios we'll examine are those designed to measure corporate profitability. As the most commonly used ratios, this group probably attracts the most attention. The profitability ratios are those dealing with gross profit margin, net profit margin, return on common equity, earnings per share, and price/earnings. Each ratio examines a different corporate area to see how profitably it is being run.

Profitability ratios can help you evaluate whether a company would make a good investment. In addition, they provide valuable information to company managers or owners who want to keep track of their own operating efficiency.

Gross Margin. We'll begin by looking at the gross profit margin. This percentage tells us how much profit a company earns, expressed as a percentage of sales. It shows whether product pricing is such that the company can run at a profit, and it is also used when competitive companies in the same industry are being compared; those with the highest ratios provide the most attractive investment possibilities.

Gross Profit Margin =

(Net Sales − (Cost of Goods Sold + Depreciation) / Net Sales) * 100

= (Item 24 − (Item 25 + Item 27) / Item 24) * 100

= (249,000 − (215,500 + 3,500) / 249,000) * 100

= (30,000 / 249,000) * 100

= 12.0%

Notice that in the numerator of this ratio we include depreciation as a cost of goods sold. This helps represent the true cost of manufacturing a product.

For a manufacturer, Widget shows a relatively low profit margin, and this will affect its overall profitability. A potential investor or a motivated manager might want to investigate the reasons for this low margin; one possible cause is inappropriate product pricing.

Net Profit Margin. The net profit margin is calculated in a similar way. This ratio reflects a company's performance after all operating costs have been deducted.

While the gross margin shows how well management can turn over its product at a profit, the net margin measures how well management runs the entire business operation. This includes the cost of running such areas as sales and administration as well as distribution and marketing.

To make a comparison between different companies meaningful, the earnings figure must be taken before minority interests and extraordinary items have been accounted for; many companies do not have subsidiaries, and extraordinary items are not truly indicative of a business's regular operations.

Net Profit Margin =

(Net Profit (Before minority interests and extraordinary items) / Net Sales) * 100

= (Item 34 / Item 24) * 100

= (7,900 / 249,000) * 100

= 3.2%

The difference between the gross profit margin and the net profit margin is that gross profit margin evaluates a company's management solely on the basis of operating performance. By the time you get down to the net profit line, nonoperating factors such as debt expense have been deducted. Gross operating margin may show that management may be doing a good job of handling production operations, and yet the net profit margin may be poor. This situation could be the result of heavy financing expense, or it could be caused by some other nonoperating factor.

Our gross and net margin calculations for Widget were 12.0 percent and 3.2 percent respectively. By examining these two ratios, we can determine whether specific areas of the company's operation are below par.

Return on Common Equity. The net return on common equity is another way of seeing how hard a company makes its cash work. If you're a common shareholder, this statistic will be especially near and dear to your heart.

Net return on common equity shows the earnings created by each dollar of equity that shareholders have invested in a company. If you're thinking about investing in a company, you'll be looking for one that earns a good return for its shareholders.

Net Return on Common Equity =

(Net Profit before Extraordinary Item less Preferred Dividends / Common Equity) * 100

= (Item 34 − Item 37 / Item 20 + Item 21) 100

= (7,900 − 800 / 54,000 + 33,500) * 100

= (7,100 / 87,500) * 100

= 8.1%

The better the return on common equity, the better the job management is doing of using the equity owned by the common shareholders.

Earnings Per Share. Another measure of business profitability is the earnings-per-share ratio. This helps shareholders in a company predict whether the board of directors of a company is going to pay dividends.

This ratio finds the annual earnings left over for the common shareholders, then divides this amount by the number of common shares outstanding to arrive at the earnings per common share. If these earn-

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ings are high, a company's directors are more likely to pay dividends. They realize that most shareholders like to feel that some of the profits are flowing back into their pockets, and as a result they try to pay dividends when possible.

To calculate this ratio, we proceed this way:

Earnings Per Share =
Net Profit Before Extraordinary Item less Preferred Dividends / Number of Common Shares Outstanding
= Item 34 − Item 37 / 2,500
= 7,900 − 800 / 2,500
= 7,100 / 2,500
= $2.84

Widget was able to earn $2.84 for each share of common stock outstanding. If the annual dividend was $1.00 per share, then the earnings of $2.84 per share will cover the expense quite well.

Companies with a long tradition of paying dividends will often continue paying them through good times and bad. But a company has to earn the dividends at some point. If it doesn't manage to do this, it will either have to stop paying dividends eventually or go broke. If a company has not earned its dividends but has continued to pay them over several years, that can be an indication that investors who require regular income should steer clear.

Price/Earnings. The price-to-earnings ratio is the final ratio we'll consider. It is used by potential investors to add more meaning to the earnings-per-share figures calculated for various companies.

Direct comparison of different companies based on their straight earnings-per-share figures can be confusing and misleading because common share prices vary from company to company. For instance, company A may earn $2 per share with its stock priced at $20 per share, while company B earns $1 per share with its stock selling for $10 per share. Though company A's earnings are twice those of company B, the shares of each company represent equal value. You have to pay twice the price for A's stock; in the end, you have paid the same price for a dollar of earnings.

Suppose that Widget common stock is currently trading at $12. To eliminate the price factor, the price/earnings ratio for Widget is calculated as follows:

Price/Earnings Ratio = Current Price of Stock / Earnings Per Share
= 12.00 / 2.84
= 4.22

If you were to return to companies A and B and use this formula to calculate their price/earnings ratios, you'd find those ratios to be identical, even though one company earns twice what the other does.

By looking at the price/earnings ratio for Widget, we are able to learn that the market is willing to pay $4.22 for a dollar's worth of Widget earnings. When the price/earnings (or P/E) ratios of companies are being compared, a higher ratio indicates that the market is more positive about the future earnings potential of a company. In other words, the average investor is willing to accept (and pay for) a high P/E ratio for a company's earnings today because future prospects look even better.

Summary

Sifting through financial statements searching for useful facts is hard but rewarding work. Ratios can help us get to the bottom, or at least closer to the bottom, of how well a company is being managed and what its prospects are for the future.

We've divided ratios up into four main groups, looking at a company's liquidity, long-term solvency, efficiency, and profitability. We used the financial statements of Widget Manufacturing company in order to practice calculating the various ratios, and we also discussed ways to interpret results above and below industry averages.

The limitations to the usefulness of ratios were discussed. Because of their importance, we'll state them again here:

- Since the balance sheet of a company represents a snapshot in time on only one day of the year, and since the income statement represents only one year of corporate operation, conclusions based on ratios are more reliable if several years of financial data are used and trends in ratios are examined.
- Acceptable ranges for ratios are only guidelines, and, like the ratios themselves, indicate general information, not facts etched in stone.
- Only ratios of companies in similar industries should be compared.
- It's important to stop and think about what a ratio actually says about the company in question. Be sure you look before you leap to any conclusions.
- If investing is your key aim in employing these ratios, don't act before you ask an investment professional's opinion. You may be missing something.

Next month—what we've all been waiting for. We'll build the financial spreadsheet containing all thirteen ratios and use it to examine a real live company. Tell your friends. ▲

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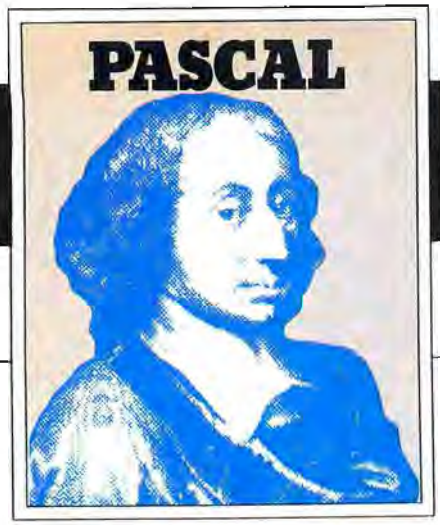

FROM BEGIN TO END

by Bruce Webster and Deirdre Wendt

Last month we started a series of columns on file handling in Pascal and looked at characteristics specific to IBM Pascal. This month we'll take a look at UCSD Pascal and the p-System, examining the implementations from IBM and Network Consulting (Burnaby, B.C., Canada). The column covers five major topics: disk file I/O, random access I/O, untyped files, device I/O, and error handling.

Disk Files. UCSD Pascal runs under the p-System, its own operating system, rather than under MS-DOS or CP/M-86. As such, files created by UCSD Pascal programs can be read only by other UCSD Pascal programs. Also, UCSD Pascal programs can only read files created by other UCSD Pascal programs. However, the p-System put out by Network Consulting (NCI) comes with a filer utility and a unit for program use that permit access to MS-DOS files from the p-System.

Disk files created by the p-System have two characteristics that distinguish them from MS-DOS files. First, the p-System allocates disk files in *blocks*, chunks of disk space that hold 512 bytes each. For example, a double-sided, 320K disk would be divided up into 640 blocks.

Second, all the blocks in a file are contiguous; that is, they follow one after the other. For example, if a file were ten blocks long and started at block 150, it would occupy blocks 150 through 159. These two characteristics tend to waste disk space, but they make for a simple and predictable method of file handling, and they can be helpful in low-level file access (see the section on untyped files later in the column).

A filename can be up to fifteen characters in length and can include just about any printable ASCII character (although certain ones should be avoided for special reasons). You can also tack an optional volume specification on the front of the filename. This can be the actual volume number ("#⟨nn⟩:") or the volume name ("⟨name⟩:"), which can be up to seven characters in length itself. Thus, a given file specification can have a maximum length of twenty-three characters. Here are some sample filenames:

```
STARS.TEXT
ALL.STARS.DATA
#4:SYSTEM.MISCINFO
#12:!(&#.@3232.+
LONGEST:FILE.NAMES.EVER
```

Last month you worked with a sample program that opened a textfile, read in numeric data, opened a binary file and wrote the data out to it, then closed both files, deleting the textfile. Here's the same example rewritten for UCSD Pascal:

```
CONST
  infilename  = 'STARS.TEXT';
  outfilename = 'STARS.DATA';
TYPE
  stars       =  ARRAY[1..3] OF real;
  { [1] = x, [2] = y, [3] = z }
VAR
  infile      : text;
  outfile     : FILE OF stars;
  x,y,z       : real;
BEGIN
  reset(infile,infilename);        { open to read }
  rewrite(outfile,outfilename); { open to write }
  WHILE NOT eof(infile) DO BEGIN
  readln(x,y,z);          { read in values }
  outfile^[1] := x;       { copy to file variable }
  outfile^[2] := y;
  outfile^[3] := z;
  put(outfile)            { write out to disk }
END;
  close(infile,purge);    { remove textfile }
  close(outfile,lock)     { close and save data file }
END. { of PROGRAM convert }
```

P-System File Handling

Unlike IBM Pascal, UCSD Pascal doesn't need a separate *assign* step to open a file. Instead, you simply include the filename in the *rewrite* or *reset* statement. The *close* statement takes the form

close(⟨file⟩[,⟨option⟩]);

where ⟨option⟩ is an optional command that tells the system what you want done with the file. Here are the options and their effects:

normal	don't save any data written to the file; that is, ⟨file⟩ was a temporary file. This is the default: close(f) = close(f,normal).
lock	save the data written out to ⟨file⟩ as a disk file.
purge	delete the disk file associated with ⟨file variable⟩.
crunch	same as lock, but throws away all of the file following the last record read or written.

Incidentally, when you rewrite a file that already exists on the disk, the original is left untouched until you close the file with the lock option. At that time, the original file is deleted and the new file is entered into the disk directory with the proper name. This provides a simple mechanism for updating an existing file without worrying about filenames.

Random Access I/O. You may want to read and write data in a file in a nonsequential or random manner. For example, having created the file Stars.data, you might want to retrieve the coordinates of a given star without (1) reading the entire list of stars into memory, or (2) resetting the file and reading through all the preceding stars to get to the one you want. The ability to read (or write) directly to any record in a file regardless of its location is called *random access*.

UCSD Pascal allows you to have random access to a file by opening it with *reset*, then using the *seek* command to move it to a given posi-

tion in the file. For example, if you wanted to open a star data file so that you could read the coordinates for any given star, the program you might use would look like this:

```
PROGRAM look_at_stars;
  TYPE
    stars = ARRAY[1..3] OF real;
  VAR
    datafile   : FILE OF stars;
    x,y,z      : real;
    starindex  : integer;
  BEGIN
    reset(datafile,'STARS.DATA');
    REPEAT
      write('Enter star # (0 to exit): ');
      readln(starindex);
      IF starindex > 0 THEN BEGIN
        seek(datafile,starindex+1);  { move to the star }
        get(datafile);               { and read it in   }
        write('Coordinates of star #',starindex:3,': ');
        write('(',datafile^[1]:12:4,',',datafile^[2]:12:4,
              ',',datafile^[3]:12:4,')')
      END
    UNTIL starindex <= 0;
    close(datafile,lock)
  END.
```

The *seek* statement moves us to a specific record in a file. The first record is record #0—that is, *seek(⟨file⟩,0)* would point at the first record in ⟨file⟩.

There are a few restrictions on using *seek*. First, it can't be used with a textfile (text, interactive, or FILE OF char) or an untyped file. Second, you should always make a call to *get* or *put* between any two calls to *seek*; otherwise you have no guarantee about the contents of ⟨file⟩. Last, if you call *seek* with a negative value or a value greater than the number of records in the file, the next call to *get* or *put* will cause the system function *eof(⟨file⟩)* to return true.

Untyped Files. All the UCSD Pascal files we've looked at have been textfiles (= FILE OF char) or data files (= FILE OF ⟨type⟩). However, there are times when you want to deal with raw data, data that haven't been formatted. For example, in a computer game you need to have many different types of data out on the disk. However, you don't want the overhead of having several files open at once or having to open and close files constantly.

The solution? You put everything in one large disk file and use an untyped file to access it. An untyped file is declared as follows:

```
VAR
    bigfile    : FILE;
```

It's opened and closed just like any other file. Reading from and writing to it are different, though, from other files.

Untyped files can only be read or written a block (512 bytes) at a time. You do this using two functions, *blockread* and *blockwrite*. Here's their format:

```
bcnt := blockread(⟨file⟩,⟨buf⟩,⟨numblks⟩[,⟨offset⟩]);
```

We listed only one, because the other has exactly the same parameters. ⟨file⟩ is, of course, the untyped file variable (such as bigfile above). ⟨buf⟩ can be any type of variable; however, it had better be at least 512 bytes in size, or your program will do bizarre things. ⟨numblks⟩ is an integer value giving the number of blocks you wish to read (or write). This value makes further requirements on the size of ⟨buf⟩, namely that ⟨buf⟩'s size be greater than or equal to 512* ⟨numblks⟩.

The last parameter, ⟨offset⟩, is optional. If you don't specify it, you will begin at the start of the file and proceed through to the end. If you do use it, you will start reading from (or writing to) the file at the block you've specified. This allows you to access an untyped file randomly (since you can't use the *seek* command). Both the *blockread* and *blockwrite* functions return the number of blocks really read (or written) as a check for hitting the end of the file or some disk error.

Let's look at an example. Suppose that blocks 10 through 13 of your data file contain records that are, for convenience' sake, thirty-two bytes each. Each block thus has sixteen of these records in it, and there are sixty-four records in all. You could then write the following routine to *get* or *put* a specific record (numbered 0 through 63) from that chunk of the file. Call the record type *goodrec* and assume that your untyped file (bigfile) is already open.

```
    PROCEDURE goodrec_IO(indx : integer;
                         read : boolean;
                     VAR rec  : goodrec);
{
  does read/write for record[indx], where indx is in the range
0..63
  and the records are found in blocks 10..13 of bigfile
  if read = true, then reads record, else writes it
}
  VAR
    bcnt,iblk,irec   : integer;
    data             : PACKED ARRAY[0..15] OF goodrec;
  BEGIN
indx := abs(indx) MOD 64;   { force to allowable range }
iblk := indx DIV 16 + 10;   { calculate block #       }
irec := indx MOD 16;        { calculate rec w/in block }
bcnt := blockread(bigfile,data,1,iblk); { get the data }
  IF read
    THEN rec := data[irec]  { get appropriate record   }
  ELSE BEGIN
    data[irec] := rec;      { else save it in 'data'   }
    bcnt := blockwrite(bigfile,data,1,iblk) { & write it }
  END
END; { of PROC goodrec_IO }
```

By writing similar routines for the other data types stored in bigfile, you can have ready access (and random access, at that) to a wide variety of data types with a minimum of overhead. If the size of the buffer (512 bytes or some multiple thereof) bothers you, you can always use *mark*, *new*, and *release* to create it on the heap and then get rid of it.

Device I/O. Most applications require I/O involving the computer hardware itself. Reading from the keyboard and writing out to the screen are the two most obvious examples. Standard (and UCSD) Pascal predefines the textfiles input and output for just those functions. All *read* and *write* statements without a file variable use these two files. But there are other times when you might want to read from or write to a specific device. How do you do this?

Simple: Use a set of special filenames that refer to hardware devices rather than to disk files. For example, suppose you wanted to modify Convert so that you could enter the data manually instead of having it read from a disk file. You would simply change the string constant infilename to read 'CONSOLE:'. You would then enter the data, line by line. When you were done, you'd type control-C; this tells the program it's reached the end of the file.

By the same token, a program that writes a textfile to disk could be redirected to write the output to the screen. Note well: Because these are character-oriented devices, only files of type text or interactive should be connected with them.

Here's a list of the special filenames that UCSD Pascal recognizes:

CONSOLE:	console I/O—that is, read from the keyboard and write to the screen
SYSTEM:	like CONSOLE:, but doesn't echo characters read in

PRINTER: the line printer
REMIN:,REMOUT: input from and output to an RS-232 (serial) port. Note that these are handled as two separate devices.

Associated with these special filenames are device numbers that can be used in one of two ways. First, the string '#⟨devnum⟩:' can be substituted for '⟨filename⟩:'. For example, the line printer is device number 6, so that you could say *rewrite(outfile,'#6:')* instead of *rewrite(outfile, 'PRINTER:')*. Second, you can use the device number for the low-level I/O routines *unitclear, unitread,* and *unitwrite:*

unitclear(devnum) makes the device think that the computer has just been turned on

unitread(devnum,buf,len,blknum,flag) reads ⟨len⟩ bytes from ⟨devnum⟩ into ⟨buf⟩. If ⟨devnum⟩is a block-oriented device (that is, a disk) then starts at ⟨blknum⟩. If ⟨flag⟩ = 2, then reads one physical sector starting at ⟨blknum⟩. ⟨blknum⟩ and ⟨flag⟩ are optional.

unitwrite(devnum,buf,len,blknum,flag) just like unitread, but writes instead

Here's a list of the standard device numbers, along with some extensions:

dev num	device
1	CONSOLE:
2	SYSTEM:
3	⟨unused—was GRAPHIC: in original p-System implementation⟩
4	boot disk drive
5	second disk drive
6	PRINTER:
7	REMIN:
8	REMOUT:
9–12	more disk drives; #11: is default RAM disk for IBM UCSD implementation, while #12: is default RAM for NCI version
13–26	used by NCI for subsidiary volumes (sub-directories on disks)

Error Handling. There are few things more irritating than having a program blow up because you entered the wrong filename or because the program ran out of space on the disk. UCSD Pascal automatically generates error-checking code when you compile a program. However, you can turn off the generation of such code with a compiler switch. If you insert the comment {$I− } into your program, the compiler will no longer generate I/O checks until it encounters the comment {$I+}. This prevents your program from halting should an error occur. However, you still need to know what the error was. The p-System tells us via the function *ioresult*, which returns an integer value indicating what the error was. Here's a list of the error codes:

error code	meaning
0	no error
1	bad block—parity error
2	illegal device number
3	illegal I/O request
4	datacom time out
5	volume is no longer on-line
6	file is no longer in directory
7	illegal filename
8	not enough room on volume
9	no such volume on-line
10	file not found
11	duplicate directory entry
12	file already open
13	file already closed
14	bad value format (real or integer)
15	read past end of file
16	volume is write-protected
17	illegal block number
18	illegal buffer

For example, you might modify Convert to prompt for an input filename and test to see if the file really exists:

```
{$i−} { turn off I/O error checking }
REPEAT
  write('Enter name of data file: '); readln(filename);
  reset(infile,filename);
  tval := ioresult;              { get error code }
  IF tval > 0
    THEN writeln('Error on opening file: ',tval)
UNTIL tval = 0;
{$i+}    { turn I/O error checking back on }
```

If you wanted to get more explicit, you could write a procedure that would give us a more informative error message based on the value of Tval, like the procedure we showed last month for IBM Pascal.

Conclusion. That should be enough to keep you going on UCSD Pascal. We had thought of tackling Modula-2, but there are so many differences that it warrants a future, separate column. Next month, we'll continue to discuss file I/O, looking at the specifics of Pascal/MT+ from Digital Research. See you then. ▲

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COMPAQ INTRODUCES XT WORKALIKE

by Mark Kellner

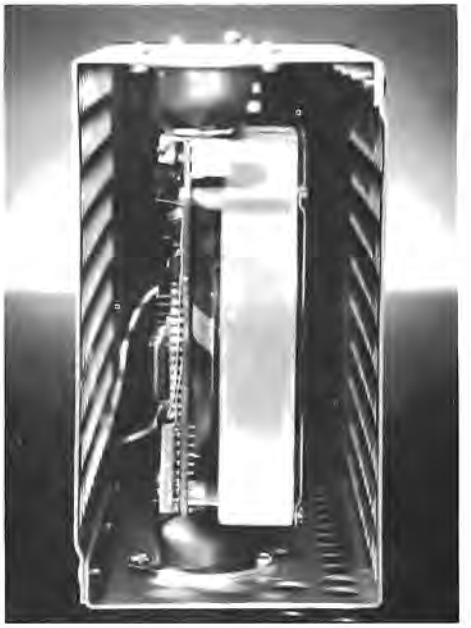
One year after introducing the first transportable "clone" of the IBM Personal Computer, Compaq Computer Corporation has released a new product that follows the lead—if not the schematic—of another Big Blue product. At a news conference in New York on October 25, the company announced the Compaq Plus, a transportable version of the pc-XT, complete with a ten-megabyte Winchester disk.

Apart from its Winchester controller card and disk drive, the Plus is in every obvious respect identical to the original Compaq. It has a single 5 1/4-inch double-sided disk drive in the A position (the company apparently decided that implementing a pair of half-height floppies, thereby surpassing the XT in convenience and functionality, would not be a wise move), 128K of RAM (with room for an additional 128K), and a single adapter card for both monochrome and graphics display. Like the original Compaq, the Plus in its standard configuration offers two expansion slots, a parallel printer port, and connections for output to an RGB monitor, a composite video monitor, and (by way of an RF modulator) a standard television set. Like the pc, the original Compaq, and the XT, the Compaq Plus is shipped with an empty socket for the Intel 8087 floating-point processor.

Unlike the XT, the Compaq Plus does not come with an asynchronous communications card; Plus owners can buy one from Compaq for an extra $115. According to Compaq spokesman Ken Price, a survey indicated that "many users don't require" the communications capability, so the asynch card was made optional.

Along with the Compaq Plus, the company announced that it's begun shipping MS-DOS 2.0 and BasicA 2.0. Compaq owners have been able all along to buy and use DOS 2.0 as supplied by IBM; now they can get it under Compaq's label.

Retail price for the new machine, with 128K and no asynch adapter, has been set at $4,995.



The Winchester drive in the Compaq Plus has been designed with a shock-absorbing mount for the rigors of travel.

An upgrade kit, which enables owners of the original Compaq to retrofit their machines with the hard disk and controller card, is available for $2,500.

There are some differences between the XT and the Compaq Plus. One is the addition of "shock protection mounting," consisting of a frame of crossed aluminum strips covering the CPU, video display, and the disk drives. The company's promotional literature stresses the durability of the frame and of the machine's outer housing, which is made of Lexan, a plastic used for bulletproof partitions.

The Compaq Plus weighs in at thirty-one pounds, three pounds heavier than a standard Compaq equipped with a single floppy disk drive but a pound less than a two-floppy Compaq. The Winchester drive weighs a little less than a floppy drive.

At the same news conference, Compaq announced it has filed papers with the Securities and Exchange Commission seeking to sell six million shares of common stock in a public offering. Underwriting the sale are L. F. Rothschild, Unterberg, Towbin, and E. F. Hutton. Compaq President Rod Canion said that money raised from the sale would be used primarily for expansion of Compaq's manufacturing plant in Houston, Texas.

In documents filed with the SEC, the firm reported a loss of $582,000 on sales of $58.9 million in the first nine months of 1983. In the third quarter of this year, Compaq earned $2.1 million on sales of $36 million. The initial losses were largely attributable to startup manufacturing costs, Canion said. The stock sale is expected to bring in $90 to $109 million, based on a price of $15 to $18 per share.

Compaq has also opened a European subsidiary based in Germany that will market the computers there. Canion expected a strong demand in Europe as well as a growing market share at home. Already the firm has shipped twenty-eight thousand computers, including sixty-seven hundred in September. ▲

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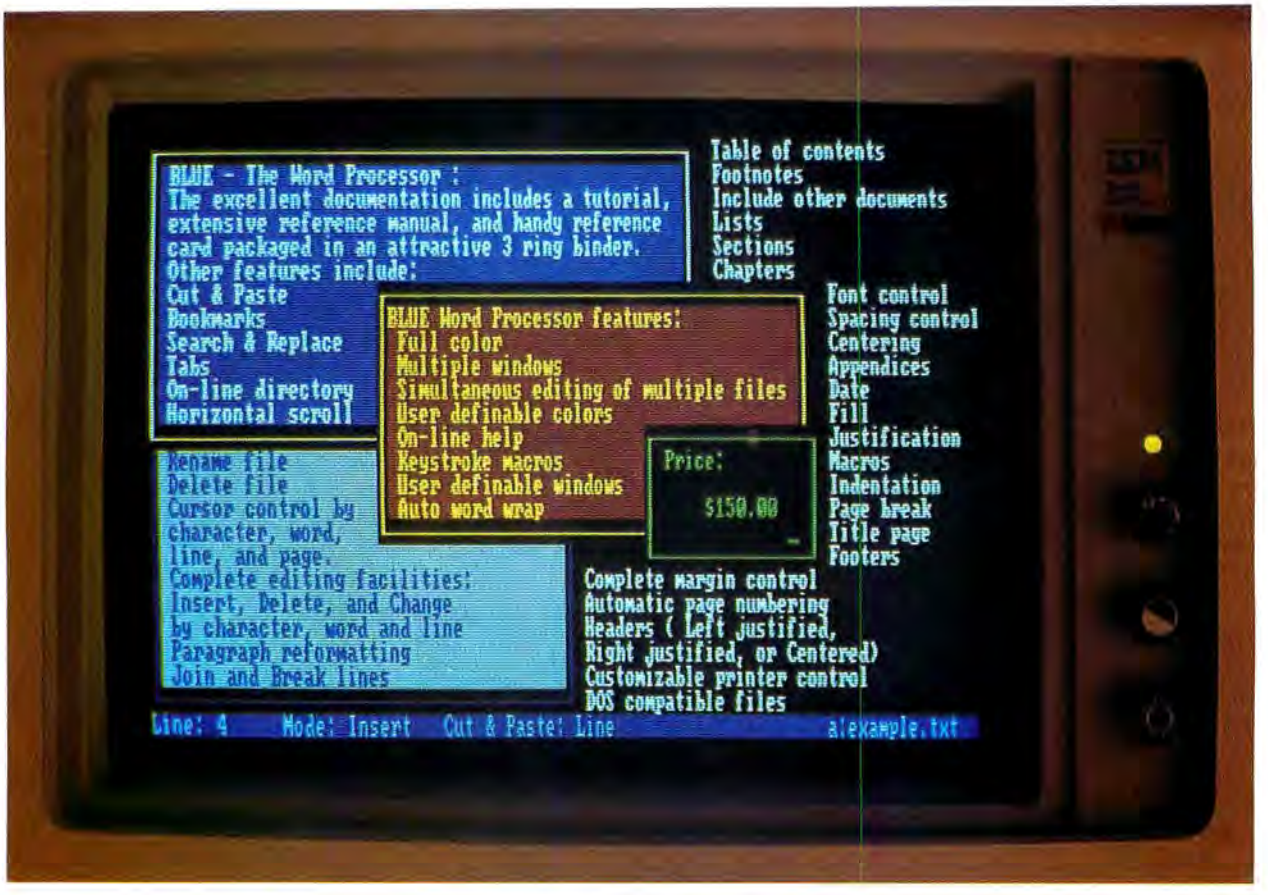

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Δ In an out-of court settlement, **Easitech** (Atlanta, GA), formed by two former Quadram employees, has agreed to cease distribution of its IBM enhancement board, which **Quadram** (Norcross, GA) alleged to be a copy of its own popular Quadboard. In the settlement of the suit filed against Quadram by Easitech and the resulting countersuit by Quadram, Easitech agreed to almost all the actions Quadram demanded—including payment of a portion of Quadram's legal fees—while not admitting any wrongdoing. Under the terms of the settlement, Easitech agreed to change the name of the company and not to use the name Easiboard for any of its products. The name is copyrighted by Quadram. The company's "EE/Easitech Excellence" logo also will be dropped.

Δ Two subsidiaries of **Warner Publishing** (New York, NY) have joined to publish and market an open-ended series of computer and software books. The joint imprint Warner Software/Warner Books logo will be integrated into a monthly trade-paperback sales program. The first books to bear the new imprint will be the *7 Simple Steps* series on selecting a computer system. A series of books developed in cooperation with the editors of *List* magazine will also be released under the joint title.

Δ An established British company in the project management field, **Computerline Limited** (Quincy, MA), has announced the opening of an office in the United States. Because of demands from the American market and existing users, an administrative and technical staff has been set up in the Boston area.

Δ **Peter J. Highberg** has joined **Black Box** (Pittsburgh, PA) as vice president of marketing. Highberg will be responsible for all sales and marketing functions, reporting directly to the president, E.R. Yost. Before joining the company, Highberg was an executive with Digital Equipment, most recently as corporate marketing manager for the computer special systems group.

Δ A new microcomputer education company called **Know How** (San Francisco, CA) has opened its flagship micro learning center in San Francisco. The company, funded by Prentice-Hall and Pacific Technology Venture Fund, specializes in meeting the microcomputer education needs of business and professional clients and uses an integrated learning environment built around the pc.

Δ **Robert C. Schneider** has joined **Sierra On-Line** (Coarsegold, CA) as vice president and general consul. Schneider was previously a founding partner of Urland, Morello & Schneider, attorneys-at-law, in Irvine, CA. Δ Also joining the company as vice president of marketing is **Bruce T. McDonnell.** In his new position, McDonnell will be in charge of all marketing and sales activities for the game manufacturers. He was previously with Heublein Wines.

Δ A private placement of $1.2 million of common stock was completed by **Byad** (Arlington Heights, IL). The lead investor was **William Blair Venture Partners**, with other Chicago-area institutional investors participating. The company is publicly held, and public trading of its common stock will begin in late 1983 following appropriate SEC filings.

Δ **NBI** (Boulder, CO) has announced the appointment of **Leonard J. Koch** to the new position of vice president of major account marketing. He will be responsible for developing strategies and programs to expand and enhance the company's existing major account function. Koch, 40, comes to the position from a nineteen-year career in office automation and data processing with Honeywell.

Δ The applications design package called *The Creator*, from **Software Technology for Computers** (Newton, MA), has been chosen by **Softsel** (Inglewood, CA) for marketing throughout Europe.

Δ A new national sales manager for **Bristol Information Systems** (Fall River, MA) has been named. **Donald E. Buhan** will provide leadership in the marketing of the company's new business line of accounting software.

Δ The formation of **Ovation Technologies** (Boston, MA) has been announced by its founders, former senior management of The Saddlebrook Corporation. The new company, headed by **Thomas J. Gregory**, will develop and market business productivity software and integrated hardware for the pc. Ovation's founders are professional marketers rather than product developers. "We will be the first company to apply proven marketing backgrounds to a category that has been primarily product-driven," said Gregory.

Δ **Digital Engineering Group** (Houston, TX), a software engineering firm, has announced a name change to **DEG Software.** The new name was prompted by an expansion of the company's operations last year when it began developing software for the microcomputer market.

Δ **Chuck Coleman** has been selected by **FutureNet** (Canoga Park, CA) as regional sales manager, a new post. Prior to joining the company, Coleman spent four years with Kontron Electronics, most recently as district manager.

Δ **Steven Jakowski** has been elected vice president of development at **Systar** (San Jose, CA). Prior to joining the company, Jakowski held a position as a systems engineer for IBM and developed a peer-to-peer networking system for the IBM Series/1 minicomputer.

Δ **Volition Systems** (Del Mar, CA) has announced that their Modula-2 programming language will be the first software offering from **Springer-Verlag** (New York, NY), the international publisher of scientific, technical, and medical books and journals. Until now the company has concentrated on sales of the package to systems houses and software developers. The move to Springer is intended to "spark additional interest. . .in the academic, scientific, and technical fields where Springer's titles are highly respected," according to Joel J. McCormack of Volition Systems.

Δ The business software distributor, **ITM** (Walnut Creek, CA), has moved to a new fourteen-thousand-square-foot headquarters in Walnut Creek. The new building will allow the company to expand its inventory and shipping capabilities to service its growing account base. A software library and training seminar room are also planned for the space.

Δ **PrimeStar Research** (Roselle, IL) has announced that the computer article summaries and new product information contained in its two monthly publications, *Business System Update* and *Product Update*, will be available through PC Telemart, an on-line database that provides information on more than thirty thousand computer products. The arrangement allows PrimeStar to maintain the "consumer report stance that our no-advertising policy allows," according to Karuna Murphy, president of the company.

Δ The pointing devices for VisiCorp's *VisiOn* operating environment will be supplied by **Mouse Systems** (Santa Clara, CA), according to the company. The *VisiOn* mouse is a two-button version of Mouse Systems's M-1 optical mouse, which has been in production for the past year.

Δ A $25-million line of credit has been arranged from **Bank of America** by **Businessland** (San Jose, CA). The funds will be used as working capital and allow the company to pursue its expansion plans into major markets throughout the country. Δ Businessland also has announced the signing of an agreement with **Eagle Computer** (Los Gatos, CA) to market the company's pc-compatible product line, which includes the Eagle computer.

Δ The former vice president and treasurer at **National Advanced Systems** (Palo Alto, CA) has been promoted to vice president of finance and administration. **Atam P. Lalchandani** will be responsible for the company's worldwide financial and administrative functions. Δ Also at the company, **Michael N. Coulter** has been promoted to vice president of business planning from his former position as director of sales support. He will manage relations with suppliers.

Δ **Iomega** (Ogden, UT) has signed with **ComputerLand** (Hayward, CA) for the distribution of the company's cartridge disk subsystem throughout the United States through participating dealers. The subsystem is dubbed the Bernoulli Box after the seventeenth-century Swiss mathematician whose law of aerodynamics is central to the subsystem's engineering.

Δ Artist **Ronald Dale Resch** has been elected to the board of directors at **The Redding Group** (Stamford, CT), graphics software developers. Resch is currently director of Boston University's computer graphics center. He has attracted attention over the past two decades for his contributions to the field of geometric and graphic art. Of note are his special effects for the movie *Star Trek*.

Δ **Lifetree Software** (Monterey, CA) has announced the appointment of **Ned Boddie** as director of research and development, but the president of the company, Camilo Wilson, who developed the original *Volkswriter*, plans to remain a key R&D player. "Lifetree Software is creating a dedicated research and development department," said Wilson, "but I will certainly remain active in these areas."

Δ **Microrim** (Bellevue, WA) has elected **Lawrence Mayhew** to its board of directors. Mayhew is currently president and chief executive officer of Data I/O (Redmond, WA). In addition to his new post, he is also a senior member of the Institute of Electrical and Electronic Engineers.

Δ At **Source Telecomputing** (McLean, VA), **John J. Harrington** has been appointed chief financial officer. He comes to the post after six years with the parent company, Reader's Digest Association. Δ **Richard E. Huggins** has also joined the company as director of corporate development. He was previously director of marketing for CGI Systems.

Δ **Control Data** (Minneapolis, MN) plans to open nine software stores in California by the third quarter of 1984. Called Software Only, the stores will be patterned after the company's first California store, which opened in San Diego last year and carries a full range of software for several lines of micros.

Δ New digs for **Alpha Software** (Burlington, MA): Administrative offices, a warehouse, and production operations are now located at 30 B Street in the New England Executive Park. The company's new corporate center is five times larger than its previous offices nearby.

Δ **Fox & Geller** (Elmwood Park, NJ) has announced the opening of a new product distribution and sales office in London, England, bringing the number of foreign countries served by the company to eight. **Anthony Riley**, cofounder of Orchard Software (London, U.K.), will head the London office.

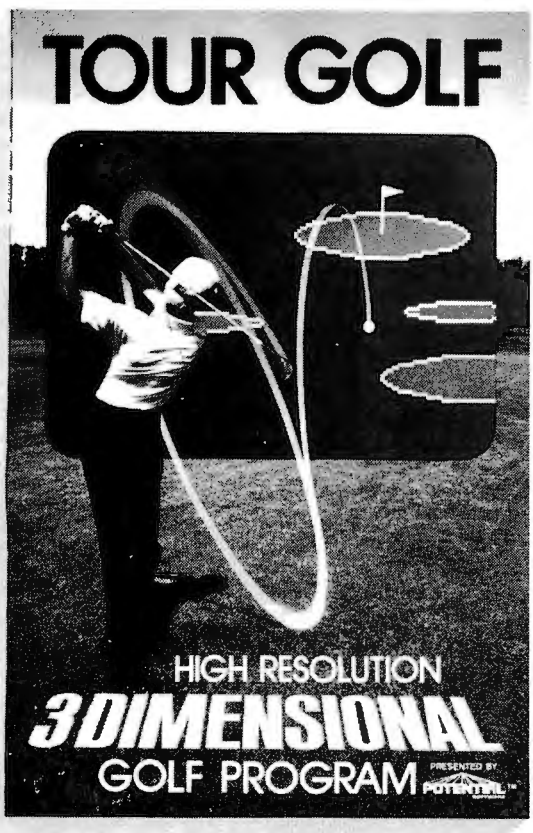
Δ The position of vice president of finance has been filled at **AST Research** (Irvine, CA). **Bruce Edwards** now will be responsible for the company's finance, accounting and control, data processing, and budgeting activities. The position is the result of the company's growth—monthly sales have increased from $200,000 to more than $3 million in less than eighteen months.

Δ **Eugene M. Hayes** has joined **Sterling Swift Publishing** (Austin, TX) as vice president, marketing. Hayes will be responsible for the support and expansion of the company's dealer and distributor network, sales and advertising policies, and related activities, both domestic and international. President Sterling Swift says Hayes "knows the education market and has been involved with school data processing for the past twenty years. His experience as a school administrator and with Westinghouse will give us the marketing strength we need to continue our growth."

Δ Three new distributors have been named by interface manufacturer **CXI** (Cupertino, CA). **Personal Business Computers** of Salt Lake City and **Computer Plus** of Denver were named along with **Turn Key Data** of Stockholm, Sweden, the company's first foreign distributor.

Δ A national network of sales representatives has been named by **T & F Software** (North Hollywood, CA). Ten independent manufacturer's representative firms have been assigned specific territories to service retail accounts in those areas. The reps named include Astocam/Avon Marketing, Brooke Marketing, Chambers and Associates, Entertainment Marketing Sales, Micro Marketing Canada, and Rep Sales.

Δ The corporate headquarters of **Lotus Development** (Cambridge, MA) has been moved to a forty-six-thousand-square-foot facility to accommodate the company's rapid growth. The new, four-story structure is five times larger than Lotus's former location. The new building, at 161 First Street, houses the executive offices and research and development facilities. Additional distribution space is planned to be leased next month. ▲



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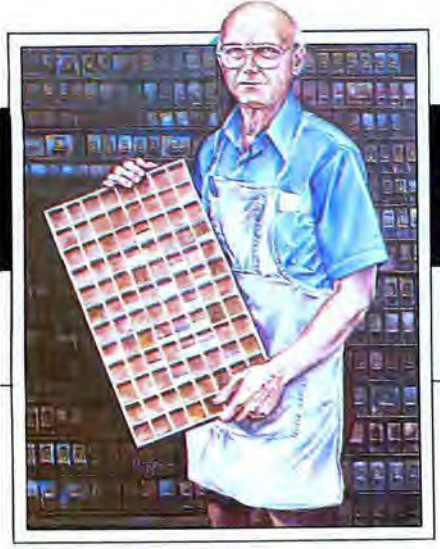

The Printed Word

by John Dickinson

It's that time of year again and you're at the office Christmas party. This one seems a little different. The company has done well this year, so the dinner is prime rib instead of the usual rubbery chicken, and everyone seems to be in a holiday mood.

The boss pats you on the shoulder and, feeling unusually expansive, says, "You really helped us a lot this year with that little computer of yours!"

You're beaming with pride when someone asks, "Hey, does anyone know the name of the sailor boy on a Cracker Jack box?"

"Sure, his name is Jack," answers someone else. "But does anyone know his dog's name?"

A murmur goes around the table as everyone tries to guess the answer. Trivia is one of your specialties, so you wait awhile before answering with, "His name is Bingo!" People look at you with admiration as your answer is confirmed.

Now it's your turn. "Does anyone know how many dots are on a line?" you ask, smiling to yourself—no one'll know this one!

There's more murmuring before someone asks, "What's a dot on a line?"

"It's probably something to do with the computer!" answers the boss.

Someone else asks, "Is it like those 'bits' and 'bytes' you always talk about?"

"Well, it's related," you answer.

"We give up," comes a plea from across the table. "I mean, if it's the computer, well, who else knows anything about it?"

Finally, you relent and answer, "There are 960 dots on a line—at least on my printer. Some have more, but mine has 960!"

"What is a 'dot on a line,' anyway?" someone asks.

"It's what makes all the characters on the printer—it makes graphics too," you answer.

"How's that work?" asks a secretary.

"It's kind of hard to explain. You see, every character is made of little dots that look pretty solid after they're all printed."

"Like connect-the-dots puzzles?"

"Sort of—well, not exactly. More like fill-in puzzles."

This is a difficult subject to explain, and it's getting late. "Look," you say, "why don't I just cook something up in the morning to show everyone what I mean—like, um, printing a Christmas card or something."

"Great—we'd like to see that," says the boss as he picks up the tab. "See you in the morning."

Now what are you going to do? It takes a lot of dots to make something like a Christmas card on a printer!

A Christmas Graphic

Lots of Dots. At least you're starting with the right answer to the trivia question. Many popular dot-matrix printers, including Epson, IBM, and Texas Instruments, do use a 960-dot pattern on an eight-inch line to form the printed words that you read. Each printed character takes up twelve of those dot positions, including two for the spaces between characters. Since most printers normally print at ten characters per inch, a quick calculation will tell you that

8 inches by 10 characters per inch by 12 dots per character = 960 dots per line

In normal print mode most dot-matrix printers actually use only half of those positions for printing. Every other position is left blank. One type of enhanced print mode uses all the available positions. Epson and IBM call this the emphasized print mode. In emphasized mode, each dot printed to form a character is reprinted next to itself, doubling the print density and making the characters darker. The other commonly used enhancement technique is to reprint the line with the paper moved up a small fraction (about 1/216th) of an inch. Epson and IBM

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call this double-strike mode. Combining both techniques quadruples the print density for maximum darkness.

Printers that are equipped with a graphics option allow you to do graphics printing in either 480-bit or 960-bit mode, the graphics equivalents of normal and emphasized printing. The use of the word *bit* here really means *bit image*. Each of the graphics dot positions is printed in the image of the bits that form one byte of data. You define the bit image by telling the printer what value the byte has for the position to be printed.

Each horizontal dot position is defined by the eight vertically arranged pins on the dot-matrix printer's printhead. These pins strike the ribbon and cause the dot image to appear on paper. You control which of the eight pins will print by means of a one-byte number between 0 and 255. The one-byte number is stored internally as eight bits, each of which controls the action of one of the printhead's pins. The printer will print on pins whose bit value is 1 and won't print on pins whose bit value is 0.

The number zero has a bit pattern of 00000000, so if the printer receives a zero when in graphics mode, no pins will print. The number one has a bit pattern of 00000001, so the first pin (pin 0, the bottom one) will print. The number 128 has a bit pattern of 10000000, so the last pin (pin 7, the top one) will print. Combinations of pins can be printed by using a number whose bit pattern has the desired combination of 0 bits and 1 bits. For example, the number 165 has a bit pattern of 10100101, so it causes the first, third, sixth, and eighth pins to print.

Defining all the combinations may seem difficult, but it can be made easier with a little organization. It's best to think of individual pins in terms of powers of two (that is, in binary), and a small table can be a big help:

Pin Number	Power of 2	Numeric Value	Bit Pattern
None	None	0	00000000
0	0	1	00000001
1	1	2	00000010
2	2	4	00000100
3	3	8	00001000
4	4	16	00010000
5	5	32	00100000
6	6	64	01000000
7	7	128	10000000

To define an individual pin pattern we need only add up the numbers whose pin values (bit images) are correct for our needs and use the result. The number 165 is the sum of

```
  1 (pin 0)
+ 4 (pin 2)
+ 32 (pin 5)
+ 128 (pin 7)
-----
  165
```

which gives us the bit-image pattern 10100101 we noted previously.

Designing Graphics. It's usually best to design what we want our graphic to look like first and then carefully plan how to get it to print by determining the correct bit images. For example, suppose we wanted to print a square tablet eight dots high and eight dots across, like this:

Dot Position

	1	2	3	4	5	6	7	8
Pin 7 →	*	*	*	*	*	*	*	*
Pin 6 →	*							*
Pin 5 →	*							*
Pin 4 →	*							*
Pin 3 →	*							*
Pin 2 →	*							*
Pin 1 →	*							*
Pin 0 →	*	*	*	*	*	*	*	*

The right and left sides require all eight pins to print, so we add the values for each pin to get:

1 + 2 + 4 + 8 + 16 + 32 + 64 + 128 = 255

For each intermediate dot position in our square we need to print only pin 0 (the bottom one) and pin 7 (the top one), so we add the values for those two pins to get the correct bit-image value:

1 + 128 = 129

So the number pattern that gives us the correct bit images for our tablet is

255 129 129 129 129 129 129 255

If we want to get a little fancier, we might put a diamond in the middle of the tablet, like this:

Dot Position

	1	2	3	4	5	6	7	8
Pin 7 →	*	*	*	*	*	*	*	*
Pin 6 →	*			*	*			*
Pin 5 →	*		*			*		*
Pin 4 →	*	*					*	*
Pin 3 →	*	*					*	*
Pin 2 →	*		*			*		*
Pin 1 →	*			*	*			*
Pin 0 →	*	*	*	*	*	*	*	*

This is a little more complicated. The sides, top, and bottom are the same as before, but the intermediate positions are different. Once again, a table can help us:

Pin #	Pos 1	Pos 2	Pos 3	Pos 4	Pos 5	Pos 6	Pos 7	Pos 8
7	128	128	128	128	128	128	128	128
6	64	0	0	64	64	0	0	64
5	32	0	32	0	0	32	0	32
4	16	16	0	0	0	0	16	16
3	8	8	0	0	0	0	8	8
2	4	0	4	0	0	4	0	4
1	2	0	0	2	2	0	0	2
0	1	1	1	1	1	1	1	1
Total	255	153	165	195	195	165	153	255

The numeric pattern with the bit images required to make the tablet with the diamond in it is found in the totals line at the bottom of the table. If we tell the printer to print the bit pattern defined by

255 153 165 195 195 165 153 255

the graphic tablet with the diamond in it will be printed. We could have saved a little time by noticing that the pattern is symmetrical (the left and right sides are mirror images of each other), but it can be useful at first to write everything out.

The next thing we have to do is tell the printer to print the graphics. If we just instructed the printer to print the numbers required for our bit-image patterns, we'd just get the ASCII characters defined by those numbers. For characters in the normal printable ASCII range of 32 through 127, we would get the usual characters. Which characters we would get beyond this range would depend on the printer make and model used (see previous columns for further discussions of this topic).

Talking to the Printer. Somehow you have to tell the printer to use the values you supply as graphics bit patterns and not for characters. Printers with graphics options usually use an escape sequence for this purpose. The Epson, IBM, and Texas Instruments printers provide an easy model to use. Others are similar; they usually differ only in the first part of the escape sequence.

The escape sequence comes in two parts. First, there is a command to tell the printer to enter graphics mode. For the Epson/IBM printers the sequence to enter 480-bit graphics is 027 076. To enter the 960-bit graphics mode, you enter the escape sequence 027 077.

We also have to tell the printer how many bit images to expect. This presents something of a problem, since a one-byte number can be no bigger than 255 and we are able to print as many as 960 one-byte bit

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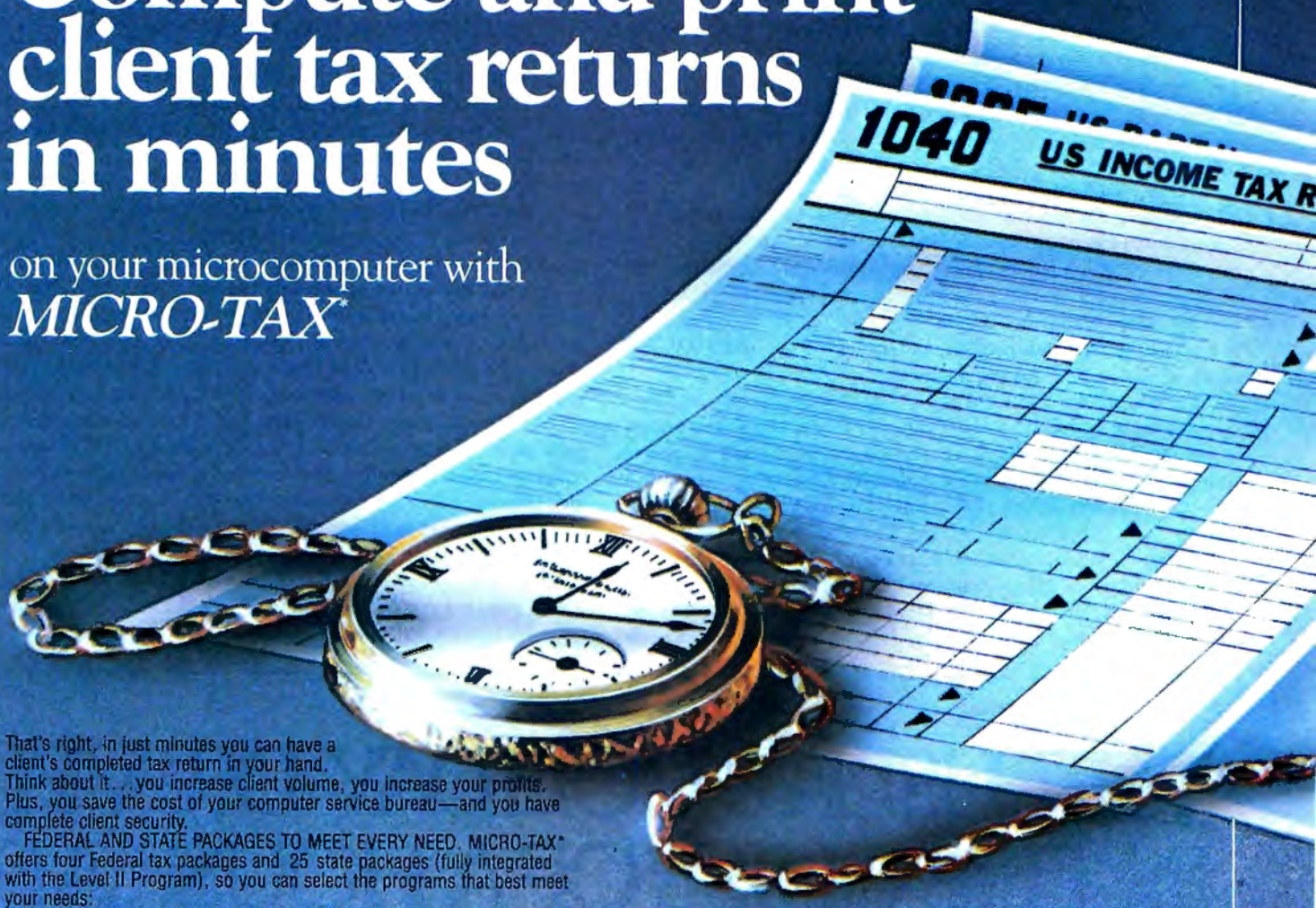

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images per eight-inch line. We solve the problem neatly by dividing the number into two pieces, called the low-order byte and the high-order byte. To get these two pieces we divide the number of bit images desired by 256; the whole-number part of the quotient is then used as the high-order byte, and the remainder becomes the low-order byte.

An example may help. If we want to print 480-bit images, the following arithmetic will get us the correct results:

480 / 256 = 1; remainder = 224

In this case, the low-order byte has a value of 224 and the high-order byte has a value of 1. The escape sequence for printing 480-bit images in 480-bit graphics mode, then, is

027 076 224 001

To complete the entire graphics sequence we have to include the pattern we want to print. So if we want to print our simple eight-position square in 480-bit mode, we need only print eight bit images. The arithmetic needed to compute the low-order and high-order bytes is:

8 / 256 = 0; remainder = 8

The low-order byte therefore is 008, and the high-order byte is 000. The entire graphic sequence for the square is:

027 076 008 000 255 129 129 129 129 129 129 255

In practice it is difficult to transmit this much data to the printer without using a programming language. On the pc, Basic is the easiest and most accessible language. Last month we used Basic to generate a file containing one escape character. This month we'll use Basic to generate our graphics sequences.

Using Basic. All character sequences can be defined by means of Basic's *chr$* function. All you have to do is provide *chr$* with the one-byte number and tell Basic what to do with it. For example, the character *A* is ASCII number 65, so it can be defined in Basic as *chr$(65)*. To tell Basic to have the printer print an *A* on our printer, we would say:

```
LPRINT CHR$(65)
```

To concatenate characters in Basic, we use a plus sign. To print the sequence *ABC*, therefore, we would say:

```
LPRINT CHR$(65) + CHR$(66) + CHR$(67)
```

Printing a graphic sequence is no different. The Basic statement needed to print our simple square is

```
10 LPRINT CHR$(27) + CHR$(76) + CHR$(8) + CHR$(0) +
   CHR$(255) + CHR$(129) + CHR$(129) + CHR$(129) +
   CHR$(129) + CHR$(129) + CHR$(129) + CHR$(255)
```

The line number allows us to save this program before running it. After you type this one-line program, use the *run* command, and the square will print on your printer. A good exercise for you would be to substitute the values of the square with the diamond in it for the simple square and run the program again.

You will notice that your printed square is very tiny. After all this work, we have defined only eight out of the 960 positions that can be used for one line of graphics printing! Even if we use only 480 positions, this can be a lot of work. To print any kind of meaningful computer graphics requires an immense amount of data and a lot of planning.

Software packages are available that do the planning and require little or no effort on your part. If you're using DOS 2.0 and have a graphics card and monitor, you can use the *graphics* command and the pc's printscreen facility to produce spectacular screen dump graphics. But this capability is limited to the IBM Graphics printer and compatibles: the TI 850 and Epsons equipped with Graftrax-Plus.

Even if you have none of the above, stay tuned and you'll get the Christmas card you promised your friends at the party. The rest of this month's column will present a Basic program that makes a greeting

MORE OF

THE USUAL HOLIDAY DRIVEL IN THE GUISE OF A HOUSE AD

Make no mistake about it: The inexorable sands of time have crept around again to that spot on the calendar we so euphemistically call the "Holiday Season." We've celebrated Thanksgiving, Christmas is this month, followed by New Year's, and then a chance to catch our breath.

So what are we thankful for? Well, we're thankful *PC* and *PC World* haven't put us out of business yet. And we're thankful that our book division has almost earned its name by getting at least one manuscript almost ready for printing. We're also grateful that one or two of our columnists are actually sending in their copy on time.

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card and uses some helpful data-compression techniques. Some tips are included on how to run the program on almost any printer equipped with a graphics option.

The Christmas Card Program. The program is as simple as it can be while still producing meaningful graphics. As noted, graphics require a lot of data, and the picture we want to draw has 10,560 separate data elements. (And it produces only eleven lines of graphics output!) To make things a bit easier, the program uses two data-compression techniques that you may want to note for future reference.

The first technique is to design the original graphic for 480-bit printing rather than 960-bit printing. (The actual work for the graphic design in the program was done by Barry Gordon of IBM's Customer Service group in midtown Manhattan.) This saves you half the work of developing numbers—in our case only 5,280 numbers had to be developed. To achieve 960-bit graphics printing, the printing of each dot position is repeated, just as in the emphasized printing technique described earlier.

The second data-compression technique is an algorithm allowing bit-image values that are repeated to be entered only once. Repeated values are very common in graphics, and this Christmas card is no exception. Each value to be repeated is entered with a companion number indicating how many times it's to be repeated. We achieve this by preceding the bit-image value that is to be repeated by a negative number indicating the number of repetitions.

For a simple example, look back at our original square. Using this "repeater" technique, the values are entered as:

```
255 -6 129 255
```

This may not sound like much, but to draw a straight bar across a graphics print using all the pins would require printing the value 255 either 480 or 960 times. You will notice that

```
-480 255
```

is much easier to enter (and think about) than

```
255 255 255 255 255 255 255 255 255 255 255. . .255
```

One other compression technique used in the Christmas card programs is to start off with one completely blank line (the first 480-bit images are initialized at zero). This line and other open areas are later filled with randomly generated snowflakes. This approach is similar to techniques that use mathematical functions (for example, a sine function) to generate graphic patterns.

The program as printed runs correctly on the IBM Graphics printer, the Epson models MX-80 (with Graftrax-Plus), FX-80, and RX-80, and on the TI 850. Tips for other printers follow.

Wide Carriage Printers. If your printer has a wide carriage, you may need to add a carriage return/line feed at the end of each graphic line. To do this, change line 1700 to read:

```
1700 IF NEW.LINE.% THEN LPRINT: LPRINT GRPH.960.BIT.$; :
     NEW.LINE.% = 0
```

Low-Density Graphics. If your printer can print only 480-bit images per line (or you wish to print the program in single density), eliminate lines 1710 and 1840 and use the following modification of line 1770:

```
1770 IF X.% = 0 AND Z.% <> OLD.Z.% AND Z.% MOD 2
     THEN X.% = 2 ^Z.%
```

Inverted Bit Images. Some printers (for example, Okidata, NEC, and C. Itoh) use bit images that are inverted relative to the ones used by IBM and Epson (pin 0, as described earlier, is pin 7, and vice versa). We've included a subroutine that inverts the graphic bit-image values defined for our graphics program. To invert the bit images for your printer, use the following modified lines to invoke the subroutine:

```
1200 IF ITEM.% >= 0 THEN GOSUB 3100 :
     GRAPHIC.%(ELEMENT.%) = ITEM.% :
     ELEMENT.% = ELEMENT.% + 1
1270 READ ITEM.% : GOSUB 3100
```

Seven-Bit Graphics. Some printers (Okidata, for example) allow seven instead of eight pins to be used for graphics printing. A few small modifications should resolve this problem:

```
1720 X.% = GRAPHIC.%(ELEMENT.%) \ 2
1760 Z.% = INT(RND * (1+6))
```

If your printer has seven-bit graphics and uses inverted bit images, add the following modifications to the inversion subroutine.

```
3150 POWER.OF.2.% = 6
3190 IF WORK.Y.% >= 0 THEN GRAPHIC.FLIP.% =
     GRAPHIC.FLIP.% + 2 ^(6 - POWER.OF.2.%) :
     GRAPHIC.BYTE.% = WORK.Y.%
```

Escape Sequences. Escape (control) sequences vary among printers, and it would be impossible to tell you exactly what the correct ones for your printer are. A list of the sequences used by the program (and their line numbers) should help you in a search through your printer manual:

Printer Control Sequences Used by Graphics Program

Line Number	Desired Printer Output
1490	Line spacing at one-ninth inch (some graphics options include this)
1520	Normal (one-sixth inch) line spacing
1540	Double-width (five CPI) characters
1550	Emphasized and double-strike printing (some printers have one or none of these)
1590	960-bit graphics. If your printer has two graphics densities, use the higher one. Be careful to follow the instructions for counting bit images exactly. There are several different methods, and an incorrect calculation will cause havoc on your printer.

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- Page number
- Date
- Program file name

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The subroutine provides a simple way to draw:
- A rectangle
- A vertical line (with or without 'T' ends)
- A horizontal line (with or without 'T' ends)
- Lines may be either single or double lines

'INPUT', 'MESSAGE', & 'CHANGE' BASIC SUBROUTINE
The 'input' subroutine will allow you to specify the length of input, type of input and redisplay format. The following types may be specified. Error checking is done on a character by character basis:
- Any ASCII character
- Only numbers
- A phone number
- A date as 'mm/dd/yy'
- A social security number
- A yes/no entry

The 'message' subroutine will display a use specified message on the 24th line and return the cursor to its original position.
The 'change' subroutine will allow you to enter a number of a field on the screen to be changed.

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- Any size record length

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MISCELLANEOUS SUBROUTINES
- Pack a string to RADIX
- Unpack a RADIX to ASCII
- Convert string to SOUNDEX key
- Get status of SHIFT, CONTROL, NUM-LOC etc.
- Set status of SHIFT, CONTROL, NUM-LOC etc.
- Determine number of days between dates
- Determine the day of the week
- Disable the BREAK key
- Delay for number of seconds
- Pack and unpack bit flags
- Menu selection subroutine
- Select monochrome monitor for use
- Select color monitor for use
- Set background to inverse video
- Set background to normal video
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- Look up a file in the directory

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Next month we'll show you what the output of the Christmas card program looks like and return to the intelligent printer series. If you don't feel like typing the whole program in, send eight dollars to Softalk/Xmas and we'll send you a disk with the Christmas card program on it.

CORRECTION

The following three paragraphs from page 126 of the September issue were in error. The statements regarding use of escape-A and escape-2 for both printers were reversed. The tables printed with the article are correct.

Variable line spacing (escape-2, escape-A, escape-3, escape-J)—Both printers have the ability to vary the space between lines. Spacing is specified in 72nds or 216ths of an inch. Setting variable line spacing in 216ths of an inch (escape-3 and escape-J) work the same on the IBM and the Epson. However, there is a subtle difference between the printers in how the 72nds of an inch options operate.

When the user specifies 72nds of an inch (using escape-A) on the MX-80 it takes effect immediately. The escape-2 code also specifies 72nds of an inch on the IBM, but the spacing does not take effect until it is enabled with the escape-2 code.

The Epson uses escape-2 to set vertical line spacing to 1/6th of an inch. You can set spacing to 1/6th of an inch on the IBM by specifying 12/72nds of an inch with escape-A, and then using escape-2.

A Christmas Graphic from *Softalk for the IBM PC*

```
1000 REM A Christmas Graphic from Softalk for the IBM PC
1010 REM
1020 DIM GRAPHIC.%(5280)
1030 REM
1040 REM - Make Open Sky
1050 REM
1060 FOR ELEMENT.% = 1 TO 480
1070     GRAPHIC.%(ELEMENT.%) = 0
1080 NEXT
1090 REM
1100 REM - Read the Graphic Data Below the Sky
1110 REM
1120 ELEMENT.TOTAL.% = 0
1130 ELEMENT.% = 481
1140 FOR COUNT.% = 1 TO 611
1150     READ ITEM.%
1160     ELEMENT.TOTAL.% = ELEMENT.TOTAL.% + ITEM.%
1170 REM
1180 REM - Single Item
1190 REM
1200     IF ITEM.% >= 0 THEN GRAPHIC.%(ELEMENT.%) = ITEM.% :
                 ELEMENT.% = ELEMENT.% + 1
1210 REM
1220 REM - Multiple Item
1230 REM
1240     WHILE ITEM.% < 0
1250     NUM.% = ABS(ITEM.%)
1260     READ ITEM.%
1270     ELEMENT.TOTAL.% = ELEMENT.TOTAL.% + ITEM.%
1280     COUNT.% = COUNT.% + 1
1290     FOR I.% = 1 TO NUM.%
1300         GRAPHIC.%(ELEMENT.%) = ITEM.%
1310         ELEMENT.% = ELEMENT.% + 1
1320     NEXT
1330     WEND
1340 NEXT COUNT.%
1350 REM
1360 REM - Check the Element Counter - Stop if Incorrect
1370 REM
1380 PRINT "ELEMENT.TOTAL.% = "; ELEMENT.TOTAL.%
1390 IF ELEMENT.TOTAL.% <> 25155 THEN
         PRINT "****ERROR IN DATA STATEMENT****" : END
1400 REM
1410 REM - Data is Loaded - Now Draw the Picture
1420 REM
1430 REM - Prevent BASIC From Sending Line Feeds
1440 WIDTH "LPT1:",255
1450 REM
1460 REM - Epson/IBM Codes Follow
1470 REM
1480 REM - 1/9th of an Inch Spacing for IBM/Epson Graphics
1490 SPC.NARROW.$ = CHR$(27) + CHR$(51) + CHR$(24)
1500 REM
1510 REM - 1/6th of an Inch Spacing (Normal)
1520 SPC.NORMAL.$ = CHR$(27) + CHR$(50)
1530 PAGE.FEED.$ = CHR$(12)
1540 WIDE.$ = CHR$(14)
1550 EMPH.DOUB.$ = CHR$(27) + CHR$(69) + CHR$(27) + CHR$(71)
1560 REM
1570 REM - 960-Bit Image Per Line Graphics
1580 REM
1590 GRPH.960.BIT.$ = CHR$(27) + CHR$(76) + CHR$(192) + CHR$(3)
1600 REM
1610 REM - Set Up Printer
1620 REM
1630 LPRINT PAGE.FEED.$
1640 LPRINT SPC.NARROW.$
1650 REM
1660 REM - Start Graphics Printing
1670 REM
1680 NEW.LINE.% = -1
1690 FOR ELEMENT.% = 1 TO 5280
1700     IF NEW.LINE.% THEN LPRINT GRPH.960.BIT.$; : NEW.LINE.% = 0
1710     PRINT.TWO.% = -1
1720     X.% = GRAPHIC.%(ELEMENT.%)
1730 REM
1740 REM - Make Snow Randomly - Remove Next 3 Lines if No Snow Wanted
1750 REM
1760     Z.% = INT(RND * (1+7))
1770     IF X.% = 0 AND Z.% <> OLD.Z.% AND Z.% MOD 2
                 THEN X.% = 2 ^ Z.%: PRINT.TWO.% = 0
1780     OLD.Z.% = Z.%
1790     LPRINT CHR$(X.%);
1800 REM
1810 REM - Print Double Density if Not Making Snow
1820 REM - Remove if Using 480-Bit Image
1830 REM
1840     IF PRINT.TWO.% THEN LPRINT CHR$(X.%); ELSE LPRINT CHR$(0);
1850 REM
1860 REM - Check for New Line
1870 REM
1880     IF ELEMENT.% MOD 480 = 0 THEN NEW.LINE.% = -1
1890 NEXT ELEMENT.%
1900 REM
1910 REM - Finish Up With Text Greeting
1920 REM
1930 LPRINT SPC.NORMAL.$ + EMPH.DOUR.$
1940 LPRINT
1950 LPRINT WIDE.$ + "= = = = = = = = Softalk Greetings 1983 = = = = = = = = "
1960 LPRINT PAGE.FEED.$
1970 REM - That's All!
1980 END
1990 REM
2000 REM Data Statements Follow . . . Enough for 480 Bit Images/Line
2010 REM
2020 DATA     -6,     0,   -14,    63,    -3,     0
2030 DATA    -14,    63,  -449,     0,   -14,   255
2040 DATA     -3,     0,   -14,   255,  -267,     0
2050 DATA      3,   127,     3,  -179,     0,   -14
2060 DATA    255,    -3,     0,   -14,   255,  -266
2070 DATA      0,     3,    -3,   255,     3,   -24
2080 DATA      0,     1,   127,     1,  -151,     0
2090 DATA    -14,   255,    -3,     0,   -14,   255
2100 DATA    -24,     0,    -5,   255,  -234,     0
2110 DATA     -2,     3,   127,    -5,   255,   127
2120 DATA     -2,     3,   -19,     0,     1,    31
2130 DATA     -3,   255,    31,     1,   -52,     0
2140 DATA      1,     3,     7,    15,    31,    63
2150 DATA    127,    -3,   255,   -87,     0,   -14
2160 DATA    255,    -3,     0,   -14,   255,    -3
2170 DATA      0,    -3,     3,    -3,    31,    -3
2180 DATA     15,    -7,     0,    -2,     3,    -2
```

```
2190 DATA    31,   -7,  255,  -42,    0,   -2
2200 DATA     3,  -29,    0,   -2,    7,  -137
2210 DATA     0,   -4,    7,  -17,    0,   -11
2220 DATA   255,  -18,    0,   63,   -7,   255
2230 DATA    63,  -51,    0,  -10,  255,   -83
2240 DATA     0,   -4,   63,  -14,  255,    -3
2250 DATA     0,  -14,  255,   -3,    0,    -9
2260 DATA   255,   -2,    0,   -2,   15,   -14
2270 DATA   255,   -8,   63,   -3,  127,    -3
2280 DATA    63,  -25,    0,   15,   -6,   255
2290 DATA    -2,   63,   -2,  255,   -7,     0
2300 DATA    -3,   15,   63,   -3,  127,    -4
2310 DATA     0,   -2,   63,   -6,  255,   -74
2320 DATA     0,   -3,   31,   -3,  127,    -3
2330 DATA    31,  -46,    0,   -5,    7,    -2
2340 DATA     0,   -4,  255,  -17,    0,   -11
2350 DATA   255,  -18,    0,   -9,  255,    -9
2360 DATA     0,   -2,    1,   -4,  127,    -4
2370 DATA    15,  -15,    0,   -2,    3,    -4
2380 DATA    15,  -11,    0,  -10,  255,    -3
2390 DATA     0,   -9,   31,   -2,    1,     0
2400 DATA    -3,    1,   -2,    0,   -3,   127
2410 DATA    -3,   31,   -3,  127,   -4,    31
2420 DATA   -50,    0,  -18,  255,   -3,     0
2430 DATA   -14,  255,   -3,    0,   -9,   255
2440 DATA    -2,    3,  -30,  255,   -4,     3
2450 DATA    -3,    7,   -3,    3,   -8,     0
2460 DATA    -5,  255,   63,  -12,  255,    -2
2470 DATA    15,    0,   -2,   15,   -2,    31
2480 DATA    -7,  255,   -4,    0,   -8,   255
2490 DATA    -3,    0,   -2,    1,   -2,     3
2500 DATA    -2,   15,   -9,    0,   -2,     3
2510 DATA    -2,    7,   -3,   15,    3,    -2
2520 DATA     0,   -2,    3,   -3,    7,    -2
2530 DATA     3,   -4,    0,   -3,    7,   -16
2540 DATA   255,   -3,    0,   -6,    3,    -7
2550 DATA     0,   -9,  255,  -34,    0,   -10
2560 DATA   255,   -2,    0,   -5,  255,    -2
2570 DATA     0,   -4,  255,   -3,   31,    -2
2580 DATA    15,   -9,  255,   -3,    0,   -24
2590 DATA   255,   -5,    0,   -9,  255,    -9
2600 DATA     0,  -10,  255,  -11,    0,    -2
2610 DATA     1,   -8,  255,  -11,    0,   -10
2620 DATA   255,   -3,    0,  -11,  255,   127
2630 DATA    -3,  255,   -2,   63,  -13,   255
2640 DATA   -14,    0,   -4,   15,   -3,     3
2650 DATA   -29,    0,  -18,  255,   -3,     0
2660 DATA   -14,  255,   -3,    0,  -51,   255
2670 DATA    -8,    0,  -32,  255,   -2,     0
2680 DATA   -10,  255,   -3,    0,   -0,   255
2690 DATA    -7,    0,  -19,  255,    7,   -34
2700 DATA   255,   -2,    0,   -9,  255,    -5
```

```
2710 DATA     0,   -3,    7,  -15,    0,    -5
2720 DATA    15,   -4,    7,   -2,    0,   -10
2730 DATA   255,   -2,    0,   -5,  255,    -2
2740 DATA     0,  -18,  255,   -3,   63,   -24
2750 DATA   255,   -5,    0,   -9,  255,     0
2760 DATA    -7,  127,    0,  -10,  255,    -2
2770 DATA     0,   -6,  127,    7,   -2,   127
2780 DATA   -10,  255,   -3,    0,   -3,   127
2790 DATA    -2,    3,   -3,   63,  -10,   255
2800 DATA    -3,    0,  -30,  255,    3,    -2
2810 DATA    31,   -2,    3,   -3,  127,    -4
2820 DATA    31,   -2,    0,   -7,  255,    -4
2830 DATA   127,  -11,    0,   -3,   31,    -2
2840 DATA     7,   -7,    1,   -2,   63,   -89
2850 DATA   255,   -3,    0,    3,   -2,     7
2860 DATA     3,    0,  -44,  255,   -3,    15
2870 DATA    -8,  255,    0,  -60,  255,    -2
2880 DATA     0,   -9,  255,   -2,    0,    -9
2890 DATA   255,   -3,   15,   -5,  127,    -4
2900 DATA     0,   -9,  255,   -2,    3,   -10
2910 DATA   255,   -2,    0,   -5,  255,    -2
2920 DATA   127,  -45,  255,   -2,    0,    -3
2930 DATA    15,   -9,  255,    0,   -7,   255
2940 DATA     0,  -10,  255,   -2,    0,   -19
2950 DATA   255,   -3,  127,  -18,  255,    -3
2960 DATA     0,  -42,  255,   -2,    0,   -11
2970 DATA   255,   -4,   63,   -3,   15,    -2
2980 DATA     1,   -2,    7,  -250,  255,   -3
2990 DATA   127,  -21,  255,   -2,  127,   -52
3000 DATA   255,   -2,  127,  -12,  255,   127
3010 DATA    -7,  255,  127,  -10,  255,    -2
3020 DATA   127,  -40,  255,   -3,  127,   -42
3030 DATA   255,   -2,  127,  -34,  255
```

Subroutine to Invert Bit Images

```
3100 REM - Flip a Graphic Bit Image Upside-Down
3110 REM
3120 IF ITEM.% = 255 OR ITEM.% = 0 THEN RETURN
3130 GRAPHIC.BYTE.% = ITEM.%
3140 GRAPHIC.FLIP.% = 0
3150 POWER.OF.2.% = 7
3160 WHILE GRAPHIC.BYTE.% > 0 AND POWER.OF.2.% >= 0
3170     WORK.X.% = 2^ POWER.OF.2.%
3180     WORK.Y.% = GRAPHIC.BYTE.% - WORK.X.%
3190     IF WORK.Y.% >= 0 THEN GRAPHIC.FLIP.% =
                  GRAPHIC.FLIP.% + 2^ (7 - POWER.OF.2.%) :
                  GRAPHIC.BYTE.% = WORK.Y.%
3200     POWER.OF.2.% = POWER.OF.2.% - 1
3210 WEND
3220 ITEM.% = GRAPHIC.FLIP.%
3230 RETURN
```


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SOFTALK IBM: 1983—

THE YEAR IN SOFTWARE

This is an index of software reviewed in *Softalk for the IBM Personal Computer* during 1983. The index includes programs reviewed in columns and feature articles as well as those reviewed in the "Marketalk Reviews" section.

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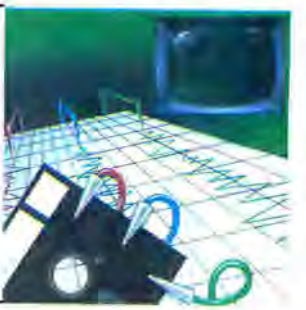
marketalk reviews



Unless otherwise indicated, software listed runs in DOS 1.1 or 2.0 with either display adapter and requires 64K and at least one disk drive.

The Ultimate

Software bearing the name *The Ultimate* sounds too good to be true. Has perfection finally been achieved by a word processor? This product's name surely indicates that there are none finer to be found anywhere.

What factors would make a product superlative in every respect? One would be a powerful text editor allowing for the polished creation and modification of one's words. Another would be simple commands that are easy to execute and easy to recall, including formatting and print commands that don't distract from the creative processes of writing. The inclusion of a typeahead buffer also would score points.

The "perfect" product would permit viewing of the printed page prior to the actual printing process. The main menu would display all functions. And why not include a spelling checker, database management system (or DIF file translator), mailing list management, and a spreadsheet to boot? Does this sound like a Christmas wish list?

All the criteria just named are present in *The Ultimate*. However, the clumsiness of some of the program's modules and the product's lack of finesse in presentation leave something to be desired.

The Ultimate is an assemblage of four modules: Word, Base (database manager), and Mail program (included on the main program disk), and Spell (on a second disk). When you boot the main program disk, you're in DOS; you have to ask the DOS command line interpreter to run the program of your choice. Once you've done that, you get a banner menu for the specified program, from which you must make additional choices. A warning: While a banner menu is on your screen, avoid hitting the semicolon at all costs. Otherwise drive A will take that keypress as a personal insult and dump you back to DOS.

Choices from the banner menu for Word, the word processing portion of *The Ultimate*, are *T* (to list the directory table), *O* (for an old file), and *N* (for a new file). Some of *The Ultimate*'s clumsiness has to do with the reading of disk directories. For example, many users prefer to store their data on a disk in drive B. While pressing *T* will certainly give you the directory of the disk in drive A, there is no way to gain access to drive B from this menu. To do so you must remove both disks from their original drives, place the storage disk in drive A, and issue the *T* command once again. After you read this disk's directory, you must return the disk in drive A to drive B and reinsert the main program disk in drive A. Confusing? Just a little.

Once you're in the word processor, *The Ultimate* starts operating in a far more likable manner. When you begin editing a new file, a text-editing screen is revealed that shows the current file's name, the cursor's position, and the total number of document lines. Below this information another line represents the master ruler complete with tab stops. Although the screen-refresh cycle seems slow, the word processor is more than adequate for most needs.

The numeric keypad generally controls cursor movement. Character and word cursor movement are restricted to the line on which the cursor rests; you may find *The Ultimate*'s lack of cursor wordwrap inconvenient.

The F10 key allows you to move the cursor in a variety of ways; it also produces the critical function menu. Pressing F10 followed by *L* will get you a query asking how many lines you want to "leap" through your document. Your answer of *+10* moves you ahead ten lines, while a *−10* takes you back that many. A *B* places you at the start of the document, an *E* at the end. Function keys also control the printing and saving of documents, the setting of printer values, the file-merging function, and deletions by character or line.

You can reset the master ruler's tabs through the function key's menu by pressing the tab key. *The Ultimate* justifies paragraph by paragraph. You must position the cursor in just the right place once the first paragraph has been justified in order for the next block of text to be justified also.

The F10 functions are extremely well programmed. You may withdraw (simply by pressing *W*) as many as twenty-five lines of text from buffer storage. These may be reinserted at any text location. To use the same stored lines more than once, a duplicate option is available.

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A fine replace/find function highlights the selected string and asks you whether you want to replace all the selected characters, replace none of them, or terminate the function without making any changes. This replace function is of particular value when you're using the spelling checker, as is the merge function, which calls into your present document any other document—from either drive A or B.

Another feature merits a loud hurrah. Assume you've written a lengthy document that you try to save to drive B, but a cold pronouncement indicating there's not enough disk space appears onscreen. What to do? You can either place another data disk in drive B or call F10 to the rescue. One of the items in F10's menus is a *kill* function. *Kill* presents you with a number of choices: You can either lose the text you're currently creating or destroy a file that is no longer needed or is of a lower priority than your current file on the B drive. *Kill* removes the files you indicate, allowing you to save the current file.

The Ultimate can take advantage of many different printers, and defaults can be changed at will.

After you write a document, you can run the material through the Spell program, which displays the total number of words checked, the number that matched, the number that didn't match, and the actual words not matched. All this appears on screen as the document is read. A final report includes an alphabetical listing of the misspelled words; these are held in a temporary file called Spell.new for your retrieval.

The best way to check the list of misspelled words against your document requires that you enter the Word program and request the file that you checked for spelling. When this file comes on screen, the cursor is positioned at the start of the document. A press of F10 brings the function menu to the top of the screen. All that's needed now is to merge Spell.new and all the misspelled words are brought to the top of the screen. Using the replace/find function, the correction process takes almost no time at all.

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Another caution: When adding to or deleting from the dictionary, you need at least 130K of free space in an alternative drive, because the program Spell.lst initially contains 13,000 words. This file is copied to your auxiliary drive to form Spell.old, which is generated from the Spell.lst file. Words are added or deleted to the Spell.old file based on the corrections found in the Spell.new file generated when you checked for misspelled words. Spell.old becomes the updated Spell.lst file when the corrections have been completed. You can then print your dictionary's words if you wish.

The database managing program, Base, could well become your favorite. It allows you to design your own forms—and the editing process is simple. Again, old or new files may be requested, and a functions menu similar to that provided by F10 in the word processing program allows for easy manipulation of your data. Base was not designed to meet the DBMS needs of a large company, but it's a fine system for home or small-business use.

The Mail program produces mailing labels and personalized letters with the help of coded documents created by the Word program. Function-key assignments control the input of additional information to already created forms as well as the reconfiguration of printer parameters. Special sorting is conducted by setting specific group values that allow you up to twenty-six sort choices.

You specify control group A, with conditions set from alphabetical or numerical to specific search characters. Pressing F5 merges the data to the form and dumps the result to the printer. Because the programs are modular, you may relocate any program you wish without incurring any problems. A handy feature indeed.

In summary, *The Ultimate* is far from terrible, but it is not what the name implies. Minor errors within the programs could have been eliminated through proper product testing. The documentation itself is good, but the printing quality produces an overall mediocre effect. For example, a copy of an example document contained on the main program disk is almost illegible. The $385 price seems a bit high in light of other products available for the pc. HL

The Ultimate, by Computer Creations (766 El Camino Real, San Carlos, CA 94070; 414-595-4466). $385.

Tycoon

Financial simulation games for the pc had best be good. After all, a lot of pinstriped users out there dabble daily in the real thing. Many of them probably bought computers as just one more weapon in the arsenal of the serious investor. But for those of us who would like to risk thousands without the pressure of wondering whether we'll be going Chapter 11 the next morning, there is *Tycoon*.

Refreshingly, *Tycoon* does not deal with the stock market. Grandmothers trade stocks. Rather, this is the high-powered world of the commodities trader. Swiss francs. T-bills. Gold. Silver. Pork bellies. A turn for the worse in Florida's weather and you really can find yourself busted overnight.

Tycoon starts you off with $10,000 seed money and some good advice. A highlight of the program is the clear, well-presented documentation, which familiarizes you both with the principles behind commodity trading and the rules of this computer version. While the rules are simple enough to enable someone to sit down and start playing immediately after skimming the documentation, there are enough subtleties later in the game to challenge an experienced player.

Information is available within the game in the form of newspaper headlines and graphs. The headlines provide you with clues as to how the various commodities are faring. Obviously, if a hurricane hits Florida, you'd be better off investing in soybeans than orange juice.

The graphs are numerous and somewhat confusing. You can see the overall performance of the commodities index or examine the records of your own investments in a somewhat bewildering variety of ways. Beginners, however, will probably be content with a single graph, which is all the program provides unless you ask for more.

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The game is not simply buy low and sell high, though. After the would-be tycoon has made some money and obtained a few promotions in status (from novice to broker to investor and so on), he or she is allowed to buy both long and short. Buying long, which is the only option at the beginning of the game, means that you expect prices to go up. Buying short, however, means that you expect prices to go down.

As a player advances, the number of commodities that can be invested in increases. While you must start out trading in wheat, cattle, soybeans, and pork bellies, you could end up dealing with T-bills, Swiss francs, and Japanese yen.

Within the limits of a simulation, the program does an excellent job of imitating life. Several people can play the game at once, and positions can be saved and returned to later. Only one game at a time can be saved, however.

The program's greatest flaw is the obviousness of most of the headlines. In the real world, trends are not as easily interpreted. Nevertheless, *Tycoon* does offer an opportunity to explore a fascinating world from the safety of one's computer. JB

Tycoon, by Jim Zuber, Blue Chip Software (19818 Ventura Boulevard, Woodland Hills, CA 91364; 213-881-8288). $59.95.

InShape

InShape won't tell you not to eat that Big Mac. *InShape* won't tell you not to follow it up with a chocolate milkshake. No, you have to supply the rebukes and recriminations yourself. But the pain of keyboarding the Big Mac (563 calories—ouch!) and the chocolate shake (383 calories—ouch! ouch!) on your daily food-consumption chart will have you treading the straight and narrow. If you've been virtuous, you'll be rewarded by watching the lines that plot your weight on the bar graph plummet and—if you've been running the treadmill and amassing aerobic points—by increased physical fitness.

InShape helps you track your fitness goals by recording daily food intake and points for aerobic exercise, and it stores and plots that information for fifty-two weeks.

A series of menus (not the food kind) prompts you to choose between food selection and exercise charts. You record your daily diet first by selecting a food group from the thirteen (plus one custom) food groups given. You then select an item from the food dictionary and enter the food for a particular meal or snack by moving the cursor and pressing a function key. Almost all of *InShape*'s actions are carried out through function keys, cursor movements, and carriage returns, so you don't have to retype the food entries or the exercise options.

The food dictionary has one thousand entries taken from "the latest USDA sources" and, in the case of the fast-food items, from information supplied by the particular chains. This leads to some interesting discrepancies: The Wendy's basic hamburger has 470 calories and 34 units of carbohydrate, while the McDonald's no-frills hamburger purports to have 255 calories and 10 units of carbohydrates. (And the McDonald's hamburger somehow manages to have more fat than the Wendy's burger, even though it has fewer calories and less carbohydrates.) DEG disclaims any responsibility for errors in the database. When looking up "bun, hamburger," to see if the McDonald's difference might be the bun, you find that the hamburger bun rates a big 0 across the board. What we have here is a new diet food, far better than celery.

Another database problem: What are the units of measure? The USDA counter is generally broken down by milligrams, but this is never made clear. The unit-of-measure problem also occurs in the aerobic section, where exercises are awarded "points" but no indication is given of what constitutes a point.

The dictionary itself is organized by food type: dairy, meat and poultry, sweets, seafood, alcoholic drinks, vegetables, and so on. Each food type is broken down by calories and amount (grams? milligrams? unit x?) of carbohydrates, fats, and proteins.

One thousand items may seem like a lot of food—indeed, it's a

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larger selection than that offered by other diet software—but it is easy to stump the food dictionary. There are, however, some very exotic items: snails; animal crackers; human milk; and brains, all kinds. If you are given to excess, or if you eat anything more complex than a boiled egg, you can customize the various food categories with additions of your choice (it's up to you to supply the data). There is also a custom section allowing you to enter values for frequently consumed items such as your favorite spinach/walnut lasagna or chocolate Amaretto cheesecake. Unfortunately, there is no method of transferring one of the meal summaries to the custom section, but it doesn't cost a great deal of energy to write the values down and keyboard them.

Supplying the values and adding up calorie totals for the separate components of lasagna may be an onerous chore, but you would have to struggle through it only once. If you have the food dictionary on your program disk, accessing an entire category, which scrolls alphabetically, takes about a minute. If you have two drives and the food dictionary on a second disk, the process is not as time-consuming.

Because of these limitations, and notwithstanding the food dictionary's specificity, the diet program can really be used only in a general way unless you follow a strict Weight Watchers-type diet. Even with a customized dictionary and the fast-food listings, it's difficult to account for restaurant meals, especially the exotic cuisine provided in many metropolitan areas.

Once you've input your meals, *InShape* will break them down in several ways to give you an idea of how much protein, fat, or carbohydrate by food group you've consumed, how many calories, the nutritional value of each meal, and the nutritional value in proportion to your weight. By using the plotting feature, you can compare daily fluctuations of your weight with any of the nutritional measures. For example, if you plot the percentage of calories broken down by meal over sixty days, you might find that you consume 60 percent of your calories at dinner; to lose weight you might consider eating a little less in the evening. Or, if you look at your fat breakdown by meal over time, the plot can give you a vivid indication that your daily breakfast of fried eggs and bacon is going to send you to the atherosclerosis ward before you're fifty.

To keep yourself going strong, you can start burning up those calories and getting those muscles into shape. You will find that you can choose from twenty-four aerobic activities (running, swimming, skiing, soccer/hockey, bicycling, golfing, walking, and so forth) and a custom exercise, say, alligator wrestling or square dancing. Again, as with the custom food items, you have to supply the aerobic values yourself. The menu guides you to select an exercise and asks you how much and how long you did it (you cannot use units like "four times around the softball field" or "until I passed out"). You are assigned a certain number of aerobic points—for example, you get 6.8 points for running two miles in twenty-four minutes. The documentation indicates that a weekly total of thirty to forty points will keep you glowing. To rack up approximately thirty-five points you would have to walk two miles in half an hour every day, run a mile in eight minutes each day, or swim fifteen hundred yards in half an hour twice a week.

InShape's most interesting feature is its ability to show your progress or lack of progress over time; you can peruse your athletic and dietary ups and downs for as far back as a year.

InShape could be used by professionals as well as by Joe and Betty Dieter; dietitians or physicians interested in their patients' well-being could use it to prescribe a program or help keep their patients toeing the line. It could be especially useful in conjunction with *The Nutritionist* (N-Squared Computing) or *Diet Analyzer* (SimSoft), two programs that provide more detailed nutritional breakdowns.

It also is suited to diet and exercise compulsives and those willing—at least initially—to spend some time putting items into the customized menu. Even with streamlining, inputting your data can take a good half hour. Truly compulsive or health-conscious people may be disappointed that *InShape* tells nothing about sodium, vitamin, or mineral content, which would make this program a genuinely useful tool.

Those with a basic knowledge of nutrition and exercise will not be hampered by *InShape*'s lack of interpretation of diet and aerobic scores. Only one person can use the calendars and plots on each disk. User support is excellent. *InShape* is not copy-protected. KTJ

InShape, by DEG Software (11999 Katy Freeway, Houston, TX 77079; 713-531-6100). $95.

Federation

Federation is a space shoot-'em-up of the *Defender* school; your ship cruises above the mountain ranges of Drorn, firing at enemy ships and dropping neutrostatic bombs on the not entirely defenseless cities that pass beneath you from time to time. Apparently, the Drorns have been supplying arms to some "nonhuman members of the Federation," and this is enough to precipitate an attack from the Feds.

Unfortunately, this is not quite the "lightning fast arcade game of skill and strategy" that the package promises. If lightning struck this fast you'd have time to position dead batteries beneath it for a recharge. The game begins with the approach of the sluggish drone ships. They can be picked off quite easily at even the highest of five difficulty levels unless your attention wanders. After you have killed enough drones, you are likely to encounter the mother ship, intelligent bombs, or both. Although the smart bombs are supposed to provide the opportunity for strategy, it does not take long to figure out how to avoid them. The mother ships, which are copped wholesale from *Star Wars*'s "Death Stars," are considerably more difficult to eliminate, despite their ponderousness. Nevertheless, a little practice soon reveals when they are most vulnerable.

Graphically, *Federation* is quite static. The Drorn ships blow up much too neatly, and their debris is transparent to your ship. The ships fly on fixed courses and shoot only straight ahead—this predictability seriously detracts from the game's ability to hold one's interest. And

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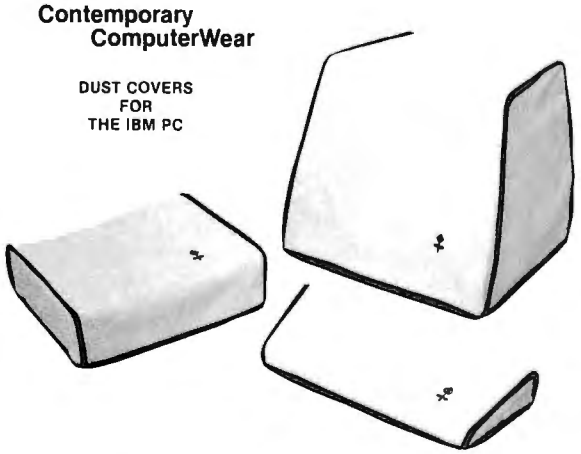

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though interstellar war may be hell, it shouldn't be dull. JB

Federation, by Avant-Garde Creations (Box 30160, Eugene, OR 97403; 503-345-3043). $29.95.

Spelbound

It would be difficult to recommend this set of word games if you had no alternative to the data that come with the program. Not only are there typos in the definitions in the Definition game (the definitions themselves seem dreadful and misleading), but the spelling list contains an egregious misspelling: *catagory* for *category*. This word pops up everywhere (as do all the words in the spelling list) from the maze game to hangman. The Misspell game, which generates misspelled words for you to correct, requires that you change *katagiry* to *catagory* to win a few points. Not the stuff spelling bee winners are made of.

All is not lost. The Setup program allows you to correct misspellings, change words and definitions, and code the games you want your children to play. By following the documentation's guideline, you can change catagory to category in no time.

This flexibility allows *Spelbound* to be useful to anyone with rudimentary spelling ability—ages six to one hundred and six. Six-year-olds will find some of the words included too difficult (*incandescent, doorjamb, inoculate*) and/or of little interest (*accountant, deterrent, hieroglyphics*). But it's easy to change the vocabulary level as often as you like, and the possibilities are delightful. For example, imagine playing hangman and having to guess your own name to save the unfortunate felon.

Spelbound includes these games: Unscramble (recognize *caooelcth* as *chocolate*), two levels of Mazes (picking words out of a block of letters—when you find the words on the word list, *Spelbound* highlights them in the block), the venerable Hangman, Misspell, Define (guess the word from its definition), Crossword Puzzle, Characters (count the number of times a letter appears in a word), Concentration (based on the old Hugh Downs game show), and Alphabet (arrange a random list of letters in correct alphabetical order). *Spelbound* makes it easy to print these games out, and some are definitely better played on paper. Trying to pick the words out of a maze on the monitor will have you seeing dancing green ants in no time.

The documentation explains *Spelbound*'s workings in clearly understandable terms, making it an easy package for the novice to use. It's one of the few around that provide computer experience for small children and that can be easily modified. It is, perhaps, in a category by itself. KTJ

Spelbound, by David and Jo Ellen Cawlfield, Blythe Valley Software (40879 Highway 41, Silver Creek Center, Oakhurst, CA 93644; 209-683-4735). $79.95.

Word Processing on the IBM

Peter McWilliams has given new meaning to the term cottage industry. Since he wrote and self-published *The Word Processing Book* in 1982, McWilliams has become the most successful and the best-known author of computer books for people who know nothing about computers. And that's still a lot of people. He followed up that same year with *The Personal Computer Book*. This year saw the publication of *The Personal Computer in Business Book*, and now there is *Word Processing on the IBM*.

McWilliams has succeeded for several reasons. Most important, he takes what many people perceive as an imposing subject and presents it in a light, easy-to-follow, if innocuous style. His books are peppered with quaint illustrations (drawn from the late nineteenth and early twentieth centuries) and humorous anecdotes. Since McWilliams's intended audience consists almost exclusively of those who have not bought a computer and aren't exactly sure why they should, this sugar-coated approach makes for a painless introduction to subjects like RAM and ROM.

In addition, McWilliams is an astute self-promoter. He is his own publisher (although he has admitted that he hopes to sell his company

soon) and has not limited himself to releasing a new edition of one of his books each month. There is also *The McWilliams Letter*, an informal, "highly opinionated," ten-times-a-year newsletter, and a column in *Playboy* on personal computing. So what does the man whom the *Houston Post* dubbed "The Dr. Spock of Personal Computers" have to say about IBM and the pc?

Not a heck of a lot.

Word Processing on the IBM bears more than a passing resemblance to its older sister *The Word Processing Book*. They are almost identical in content until you reach Part III: "Purchasing an IBM System and IBM Software." Both books begin with a brief description of the origins of word processing and some information about personal computers in general. Chapter 3 is a concise description of some common word processing features, and Chapter 4, "The Curse of Noah Webster," is essentially a heartfelt plug for *The Word* and *The Word Plus* from Oasis Software. None of this, however, is discussed in terms specific to using an IBM or IBM-compatible machine.

Part II finds McWilliams padding things a bit more. Again, this material is identical to that in *The Word Processing Book*. Each chapter in this section examines the value of word processing to particular people. Office workers are told about form letters. Students are given some questionable advice about processing their lecture notes and creating theme papers from the same. Writers are informed that computers are quieter than typewriters (although the pc is hardly the best computer for making this point). The self-employed are advised to send personalized letters to their clientele advising them of new products. Also, there is a cheerfully superfluous chapter on writing poetry with a personal computer. But nary a mention of IBM.

At last, in Chapter 12, "The IBM Personal Computers," we find descriptions of the pc and XT. Of course, the descriptions are almost identical to those in the buying guide that appears in the back of McWilliam's other books. The major difference is that some gaffes in the description of the XT, which McWilliams originally dismissed as a "color version of the pc," have been edited out. There is also an added discussion of various operating systems and a brief review of the IBM Displaywriter, a standalone word processor that IBM product centers have been trying to sell to anyone who calls to inquire about using the pc for word processing (McWilliams hates it).

The only new section of the book—a guide to word processing software for the pc—is the big disappointment. McWilliams writes that he originally intended to review each piece of software individually. After his list of software packages topped fifty, he decided to opt instead for a lengthy checklist that would outline the specific features of each package. The charts that resulted are not entirely useless, but they are probably not going to familiarize a word processing novice with the real nature of the most popular programs for the pc.

As it is, the only way a reader can compare, say, *Volkswriter* and *WordStar* is in terms of things like their search and replace functions. More subjective issues like ease of use or helpfulness of menus are ignored. While McWilliams might claim he was trying to avoid claims of partisanship, that claim wouldn't jibe with the plethora of opinions about the relative merits of different products that characterize all his books. After all, he makes no bones about not liking the pc itself, which he finds too noisy.

The reader is left wondering why McWilliams published his book in the first place. The material is almost entirely the same as that in his previous book. He doesn't even like the pc, and he provides little information about it that wasn't in the earlier book. The answer, of course, is that the Dr. Spock of Personal Computers expects a little of the IBM marketing magic to rub off on him. At this rate, we will soon be seeing a retitled version of the same book with a couple of pages added about IBM's newest entry—*Word Processing on the PCjr.* JB

Word Processing on the IBM, by Peter A. McWilliams, Prelude Press (Box 69773, Los Angeles, CA 90069). $9.95.

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Softalk IBM Goes Canadian!

The good freres Bob and Doug McKenzie aren't any funnier than have been *Softalk/IBM*'s attempts to find a way to send free trial subscriptions into Canada. After stops and starts, valiant attempts, and pitiable efforts to find an inexpensive way to make Canadians the same offer we make U.S. subscribers, we've finally faced the inevitable. There is no inexpensive way.

Armed with that knowledge, we're following a hallowed *Softalk/IBM* tradition and ignoring it. Therefore:

Effective with the January issue

Softalk will finally do what it should have done months ago. . . make free trial subscriptions available to Canadian IBM owners. Jot your IBM serial number down and send it, along with your name and mailing address, to:

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Unless otherwise indicated, software listed runs in DOS on machines with either display adapter and requires 64K and at least one disk drive.

Δ Send Bounty Bob climbing through ten screens of a uranium mine in *Miner 2049er*, the popular arcade game from **Micro Fun** (2699 Skokie Valley Road, Highland Park, IL 60035; 312-433-7550), now available for the pc. In the game you run, jump, climb, and slide through the mines, reinforcing the groundwork as you go. Elevators, cannons, chutes, and ladders will help you but, watch out, the mutants won't. Requires joystick and color/graphics adapter. $39.95.

Δ *Flypchart* is a self-paced teaching and demonstration program presented through flipchart-style screens. From **Systems Plus** (1120 San Antonio Road, Palo Alto, CA 94303; 415-969-7047). The package provides the ability to tailor a series of screens to your requirements. Presentations can take several forms: interactive training, self-paced demonstration, and automatic demonstration. $175.

Δ Published as a permanent reference manual in progress, the first issue of *dNotes, the International Journal for Microcomputer dBase II Database Software Users*, has been released by **I.D.E.A Industries** (1580 Woodvale Avenue, Deerfield, IL 60015; 312-940-1010). Editorial areas of the publication include database management, applications, forms design, reviews, and user groups. $44 per year.

Δ Carry ordinary paper through your tractor-fed printer with *Paper Tractor*, a flat plastic device shaped like printer paper that carries a sheet of nonperforated paper through a printer. From **Paper Tractor Limited** (One South Fairview, Goleta, CA 93117; 805-683-2851). $11.95.

Δ A real estate program called *Real Analyzer* allows you to decide when to buy, sell, exchange, or refinance any property by projecting cash flow and profitability before and after taxes for five years. From **Real-Comp** (Box 1263, Cupertino, CA 95015; 408-996-1160). Can be used by investors, homeowners, and tenants without computer experience. $195.

Δ **Forte Data Systems** (1500 Norman Avenue, Santa Clara, CA 95050; 408-980-1750) has announced *PC78-2*, a hardware and software package that allows the pc or XT to communicate via coaxial connection with an IBM mainframe by emulating an IBM 3278/3279 terminal. Product gives file transferability under IBM VS/TSO or VS/CMS. Upgrades and enhancements are made by swapping disks. $1,395.

Δ Directed at the business person who has a pc but doesn't really know how to use it, a three-disk tutorial is available from **Knoware** (301 Vassar Street, Cambridge, MA 02139; 617-576-3821). Using a simple game format, one can learn the basics of six business applications, from simple graphics to financial decision making. $95.

Δ An integrated set of office automation software has been released by **Schuchardt Software Systems** (515 Northgate Drive, San Rafael, CA 94903; 415-492-9330). The *InteSoft Series* is made up of seven modules, including *InteCalc*, *InteWord*, *InteBase*, *IntePert*, and *IntePlan*. Each module can work alone, or the *InteVate* module can be used to link them together. Database package includes the integrator. From $149 to $495 per module.

Δ *The Practical Accountant* is a single-entry accounting package that addresses the daily routine of accounting for the small business. From **Softlink** (3255-2 Scott Boulevard, Santa Clara, CA 95051; 408-988-8011). The package handles receipts, deposits, credit cards, accounts payable, and so on. Also prints checks with vouchers. $149.

Δ The first module in a proposed Investor Series is available from **Savant** (Box 440278, Houston, TX 77244; 713-556-8363). *The Technical Investor* contains all the standard technical analysis tools, including three kinds of moving averages, five kinds of volume indicators, regressions, point and figure charts, and more. Package can display up to four chart windows at once, each independently controlled. $395.

Δ An enhanced version of the *MicroFCS* decision support system has been released by **Evaluation and Planning Systems** (One Industrial Drive, Windham, NH 03087; 603-898-1800). New edition includes a full-screen data editor, user-defined functions and commands, and user-programmable function keys. $2,000.

Δ **Tall Tree Systems** (1032 Elwell Court, Palo Alto, CA 94303; 415-964-1980) has announced the release of *JSpool*, the DOS 2.2 sequel to its original DOS 1.1 print spooler. Delivered with source code for the drivers. $40.

Δ A two-dimensional, computer-aided design system called *Draft-Aide* is applicable to several design functions—with appropriate symbols and characters—including electrical, piping, mechanical, structural, and architectural. From **United Networking Systems** (7007 Gulf Freeway, Houston, TX 77087; 800-344-2001). The software is a production-mode system and is therefore very fast. Can interface with the pc and the XT. $595.

Δ Two training tutorials for pc users have been released by **Cdex** (5050 El Camino Real, Los Altos, CA 94022; 415-964-7600). *How To Use Your IBM PC with PC DOS* and *How To Use Your IBM PC with CP/M-86 and Concurrent CP/M-86* include four disks of interactive instruction and a reference guide of important keystrokes and operating system commands. PC-DOS tutorial compatible with DOS 2.0. $69.95.

Δ Great Snakes! *Serpentine* is an adventurous arcade game for the entire family from **Broderbund Software** (17 Paul Drive, San Rafael, CA 94903; 415-479-1170). In a maze of corridors, you are chased by three vicious serpents through twenty different maze configurations. Goal is to dwindle down the enemy by snapping at their tails and gobbling up random toads and snake eggs for extra points. Requires color/graphics adapter. $34.95.

Δ A conference to explore a broad spectrum of communications creativity and leading-edge technology will be held February 23 through 26, 1984, at the Monterey Conference Center in Monterey, California. Sponsored by **T.E.D. Communications** (635 Westbourne Drive, Los Angeles, CA 90069; 213-854-6307), the four-day event will feature visual and audio presentations by speakers from Lucasfilm, IBM, NBC, MIT, Polaroid, and Sony as well as by musician Herbie Hancock and special effects filmmaker Robert Abel. $475 per person.

Δ For creating your own custom programs, *Savvy PC* is a database management system integrated into a high-level programming language and operating system. From **Excalibur Technologies** (800 Rio Grande Boulevard N.W., 21 Mercado, Albuquerque, NM 87104; 505-

242-3333). The package can be used in a wide variety of applications, from medical analysis to agricultural accounting. Users can create applications, modify commands, and continually update the format. $395.

Δ Nine models of 5-1/4-inch Winchester disk drives, providing 10.6, 15.9, and 25.1M of formatted storage, are available from **12 Interface** (7630 Alabama Avenue, Canoga Park, CA 91304; 213-341-7914). Each disk system includes the drive, an IBM-compatible controller (if required), cabinet, cable, power supply, connector, and I/O adapter. DOS 2.0-compatible. From $1,185 to $1,985.

Δ Run one or more applications at the same time on the XT with *Thoroughbred/OS*, a fast, multiuser operating system from **Science Management** (1011 Route 22, Bridgewater, NJ 08807; 201-685-9000). Software for the system includes Thoroughbred Basic, an enhanced version of Business Basic III and Thoroughbred Idol, a database manager and applications development tool. A full range of business applications software also is available, from general ledger to payroll. $795. System modules: $395 to $595.

Δ **Analytic Information Processing** (Box 966, Danville, CA 94526; 415-837-2803) announces an expansion card cooling fan called *PCool*. The drop in temperature inside the pc with the fan installed is fifteen degrees Fahrenheit. Mounts on the front of the chassis under the pc cover. Kit with instructions: $99.

Δ A fifteen-minute continuous artistic experience is available on disk from **PC Art** (3101 Oak Street, Terre Haute, IN 47803). In addition, the program teaches the use of the *circle*, *draw*, *line*, and *paint* commands and includes a demonstration of two palettes on each of nine color backgrounds. $50.

Δ Release 2.06 of *PC/Coder*, a program development system, has been announced by **Response** (608 Second Street, Jackson, MN 56143). New version includes a 25 percent faster program generation routine and the addition of subroutines for nongenerated code. $450.

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Δ A mouse-driven software package that allows pc users to access several applications through windows and exchange data among them is available from **Graphicon Software** (399 Sherman Avenue, Palo Alto, CA 94306; 415-329-1791). *Inview* works with almost any package written for DOS 1.1 and 2.0, including *1-2-3*, *WordStar*, and *dBase II*. Operates with both floppy and hard disk systems and monochrome monitor. Requires 256K. $295.

Δ A set of five games including horse racing and target shooting is available from **The Eton Group** (160 Keller Street, Petaluma, CA 94952; 800-358-9092). *The Entertainment Set* package is menu-driven and easy to learn. $29.95.

Δ *The Software Shop Construction System* is a package designed for construction firms buying their first pcs. From **Software Shop Systems** (960 Holmdel Road, Holmdel, NJ 07733; 201-946-8900). The system is designed to follow a company's typical work flow and uses function keys, window displays, and answer wheel to make it easy to use. How-to cassette tape included.

Δ A combination I/O card that fits in any slot in the pc and the short slot in the XT is available from **IDEAssociates** (7 Oak Park Drive, Bedford, MA 01730; 617-275-4430). The *IDEAmini* multifunction card contains disk emulation software, print spooler software, and Lpt1/Lpt2 swap program. Interface and clock/calendar options available. $175 to $295.

Δ *The Data Communications Source Book* has been announced by **Information Systems Strategy** (21515 Hawthorne Boulevard, Torrance, CA 90503; 213-543-5565). The service consists of a loose-leaf reference book covering the entire spectrum of data communications and quarterly updates. Topics covered include local area networks, PABX systems, communication protocols, and so on. Can be used as a personal or technical reference. First year: $195.

Δ A fully featured portable printer has been announced by **Micro Peripherals** (4426 South Century Drive, Salt Lake City, UT 84107; 800-821-8848). The eighty-column dot-matrix Sprinter features an IBM-compatible parallel port, five character sets, programmable character design, built-in friction and tractor feed.

Δ *EasyMed* is a complete medical practice management software package from **Medical Accounts Management Services** (95 Madison Avenue, Morristown, NJ 07960; 201-539-3833). Standard features include complete patient billing, insurance claim generation, management reports for practice analysis, word processing, appointment scheduling, and a customizing function for tailoring the system. Maintains up to 32,000 patient records and prints statements automatically. $2,495.

Δ Easy to learn and use, *ResQ* is a database program that can handle 32,767 records per file. From **Key Software** (2350 East Devon Avenue, Des Plains, IL 60018; 312-298-3610). The system offers sixty fields per record and eighty characters per field. No programming knowledge is needed; just answer prompts to create custom free-form displays, reports, and calculations. Can transfer ASCII files from other database management systems and word processors. $395.

Δ A new series of hard-disk systems in their own cases has been announced by **Falcon Technology** (6644 South 196th Street, Kent, WA 98032; 206-251-8282). In addition to providing either 10 or 15M of mass storage, the *PC eXTender* series includes a serial port, clock/calendar, sockets for as much as 192K additional RAM, and utility software. Occupies only one system expansion slot. $2,295 to $2,795. Second 10M drive can be added for $1,595.

Δ Instantly calculate, carry over, and display tax results with *Series 1040* income tax software from **Calcu-Tax Computer Software** (19-21 West Mount Pleasant Avenue, Livingston, NJ 07039; 201-992-2274). The program can process both simple and complex returns because it contains all lettered schedules and twenty numbered forms, ten with multiple form capabilities. Display screens are reproductions of the 1040 forms. $1,150.

Δ **Data Consulting Group** (877 Bounty Drive, Foster City, CA 94404;

$1495 for a complete 10 megabyte hard disk system is a good deal — but not if you need 23 megabytes of storage!

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Where can I buy a Pegasus hard disk system?

Pegasus systems are available only through dealers. So contact the dealer in your area who sells IBM PC or compatible computers. If he doesn't have Pegasus, chances are he'll carry it soon. Just ask him to call us. We will ship him your Pegasus unit immediately.

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415-571-8100) has announced *PC Cash Register*, a point-of-sale program that provides inventory record storage by store number, interstore transfer, three types of inventory markdown, and automatic percentage discount. $395. Integrated purchase order control system: $100. Mailing list and labels: $75. Automatic cash drawer: $268. Δ *PC Names & Notes* is a prospecting tool for salespersons or a follow-up utility for sales support. Can have up to ninety-nine dated text records attached to any name and address record. $95.

Δ Expanded and updated six times a year, the *USMI: Market Directory* is a guide to doing business with software producers. From **Technique Learning** (40 Cedar Street, Dobbs Ferry, NY 10522; 914-693-8100). The guide profiles computer retailers, distributors, suppliers, libraries, and consultants in detail. More than five hundred current software publishers are listed, and an index provides six ways to find them. One year: $195.

Δ More than one hundred fifty investment software descriptions are listed in *Computerized Investing*, a bimonthly publication available from the **American Association of Individual Investors** (612 North Michigan Avenue, Chicago, IL 60611; 312-280-0170). Offers detailed descriptions and specifics on capabilities, systems, and features, as well as prices and addresses. Subscription includes an electronic bulletin board and message service. $44 per year.

Δ **BPI Systems** (3423 Guadalupe, Austin, TX 78705; 512-454-2801) has announced four new additions to its family of software for the XT: *General Accounting*, *Accounts Receivable*, and *Accounts Payable* are three accounting systems that run on DOS 2.0 and work on the fixed disk. New features include subqueuing of reports for unattended printing. $595 per module. Δ *Information Management* is a complete database management system, including a word processor. $425.

Δ Designed for large businesses or small, *Oz* is a financial management system from **Fox & Geller** (604 Market Street, Elmwood Park, NJ 07407; 201-794-8883). With no cells and no programming, the package offers integrated data analysis, graphics, and reports that give office managers financial control and 3-D views of data. Using simple prompts and commands, revenues and expenses can be projected, actuals and forecasts can be compared, and color graphs can display any information on the screen. Requires color/graphics adapter. $500. Δ *Grafox* is a business graphics package with full-color capabilities that can draw information from any standard IBM Basic file. Requires color/graphics adapter. $295.

Δ **American Planning** (4600 Duke Street, Alexandria, VA 22304; 703-751-2574) has introduced *MegaBasic*, a transportable version of Basic that functions under several different operating systems, requires less memory, sorts faster than conventional Basics, and more. Thirty built-in features include scan with edit, dynamic number conversion, *trace/trace if*, multiple buffers, and expanded arithmetic functions. Options require software license. $375. Development interpreter version: $199. Demo: $50. Δ *The B.O.S.S.* is a menu-driven business data management system that features large file handling and portability between operating systems, from various CP/Ms to MS-DOS. Can create applications for networking systems such as PCNet. $495. Development Basic: $199.

Δ *Cheat Sheets* are command summary cards designed to perch atop the screen and jog your memory. From **Printed Peripherals** (747 Fifty-fourth Street, Oakland, CA 94609; 415-653-7412). There are vinyl cards for *WordStar*, PC-DOS *dBase II*, *Perfect Writer*, *Multiplan*, *1-2-3*, and more. All are easy to read and arranged for quick visual access. $9.95.

Δ A word processing system that checks and corrects your spelling, *WordPlus-PC* will highlight a misspelled word and offer suggestions, in probable order of correctness, as to how to spell it, all with the stroke of a few keys. Make your choice and a word is automatically corrected. From **Professional Software** (51 Fremont Street, Needham, MA 02194; 617-444-5224). The package features a ninety-thousand-word electronic dictionary with room for ten thousand more. $495. Without *The Boss*: $395.

Δ Hand-rubbed computer furniture in a variety of woods and finishes, including light and dark oak and walnut, is made by **Computer Compliments** (Box 770843, Houston, TX 77215; 713-664-4897). Modular construction allows for configuration growth. Can be purchased complete or piece by piece. Locking compartments; centralized power bus with circuit breaker. Enclosed printer cabinet sold separately. Complete: $895.

Δ Connect your pc to a Honeywell mainframe with two emulation software packages from **Cambridge Computer** (151 Bender Road, Mount Carmel, CT 06518; 203-288-6004). Both allow the pc to emulate a Honeywell terminal without any host system or application software modification, regardless of the operating system. File transfer utility also available. *PC77/78* package emulates a Honeywell VIP7700 and VIP7800 series. $795. *PC72/73* emulates Honeywell VIP7200 and VIP7300. $395. Transfer utility: $150.

Δ A new monthly journal for *1-2-3* users, called *Absolute Reference*, has been published by Que (7960 Castleway Drive, Indianapolis, IN 46250; 317-842-7162). The November issue contained a comparison of *VisiCalc* and *1-2-3*, a review of *Financial Fastrax*, and a comparison of three plotters. Future issues will include columns on *1-2-3* features, examples of business applications, tips, product reviews, and more. $60 per year.

Δ *Data Defender* is a digital burglar alarm designed by **Picotronics** (820 East Forty-seventh Street, Tucson, AZ 85713; 602-624-8771). A pressure-sensitive mat connected to a control module containing two 100-decibel horns sits under your pc. Control module plugs into a standard wall outlet. Manual reset key enables alarm system to be deactivated by user. Up to ten mats can be connected to one module. $32. ▲

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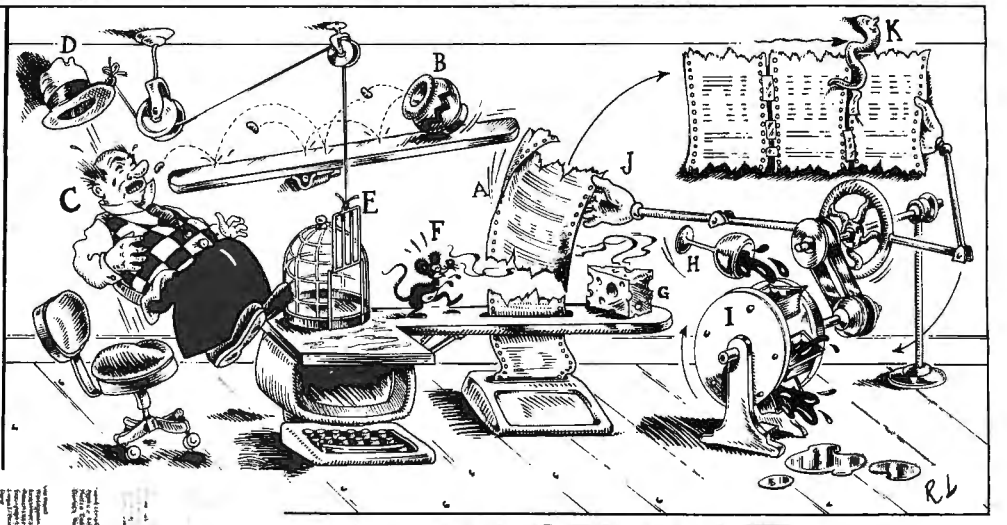

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BOARDS AND BUSES

by Kevin Goldstein

Giving Your Hard Disk the Boot

Red Face Department. The November installment of "Boards and Buses" asserted that the installable device driver for the Pegasus hard disk was supplied by Tallgrass Systems. That was a mistake. It should have said the driver and its hard-to-use interface were supplied by Tall Tree Systems, a company in no way related to Tallgrass Technologies. Tallgrass was one of the first companies to offer high-capacity hard disk systems with integral tape backup, and word in the industry is that the systems are excellent. (Look for a review of one of Tallgrass's subsystems in an upcoming issue.) We apologize for the error.

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The interface between a hard disk and a pc consists of two parts: a controller board and a host interface board. The controller board performs such functions as buffering (amplifying) weak disk signals, converting the analog signals from the disk into digital signals, and assembling the bit stream into bytes.

There is a standard controller-to-computer interface, adhered to by many 5¼-inch hard-disk controllers, called the small computer system interface, or SCSI (the name was recently changed to SCSI from SASI). The popularity of the SCSI interface greatly expedites the system integrators' task of interfacing a hard disk to various small computers: All they need to do is design a board that connects the standard SCSI interface to the desired computer's bus. That board usually plugs into the computer to which the disk will be attached (called the host computer), and is therefore called a host adapter board; the standard SCSI interface plug is then plugged into the host adapter board in the personal computer.

However, SCSI takes the concept of a standardized interface one step further than mere plug-compatibility (that is, low-level hardware and electrical compatibility), because it also specifies a standard software interface. Data transfers across an SCSI interface occur at a very high level: *read a byte* or *read a sector*, for example, are typical SCSI commands. Since an SCSI interface does most of the work, the associated device drivers can be very simple.

The Great Lakes hard disk (see the last two installments of this column) typifies the way most external hard disks are interfaced to the pc. A controller board is located in the same box as the external disk. One side of the controller board connects to the disk itself (also through a standard interface, incidentally, called an ST-506 interface); the other side of the controller board offers a standard SCSI interface and cable. A host adapter board is plugged into the pc expansion chassis, and the SCSI interface cable from the controller board is plugged into the host adapter board, thus completing the electrical connections.

At boot time, a small program called a device driver is loaded permanently into memory. Once this has been done, programs can read and write data to the hard disk simply by passing information to the device driver, which does the actual communication over the SCSI interface.

The XT disk controller does not conform to the SCSI interface. IBM has built an excellent controller that does lots of error checking and has other nice features; it does not, however, communicate with the software at anywhere near as high a level as a standard SCSI interface. From an outside vendor's point of view, that makes the attainment of 100 percent XT compatibility much more difficult than it would have been had IBM used the SCSI interface. Vendors must design their own controllers, and those controllers must exactly mimic IBM's. (A rather expensive way around that problem would be for the manufacturer to simply specify the use of the IBM controller card.)

As this column observed once before, one of the disadvantages of an external hard disk vis-a-vis the XT is that a pc with an external hard disk will always have to be booted off a floppy disk in the A drive. The reason for this annoyance can be found in the pc's ROM firmware. In addition to containing diagnostic routines, functions, and services that can be called by user programs, the ROM programs (collectively known as the ROM BIOS, for ROM Basic Input/Output Services) also contain the boot code. The boot code is nothing more than a short program that reads a small section of "startup" code, called the boot record from any system disk. Once read into memory, the BIOS passes control to the boot record; the boot record then reads the rest of the disk operating system into memory.

One of the differences between a pc and an XT is that the XT's ROM contains code that can read the boot record off either a floppy disk or the hard disk; if the XT's firmware determines that there is no disk in drive A, it au-

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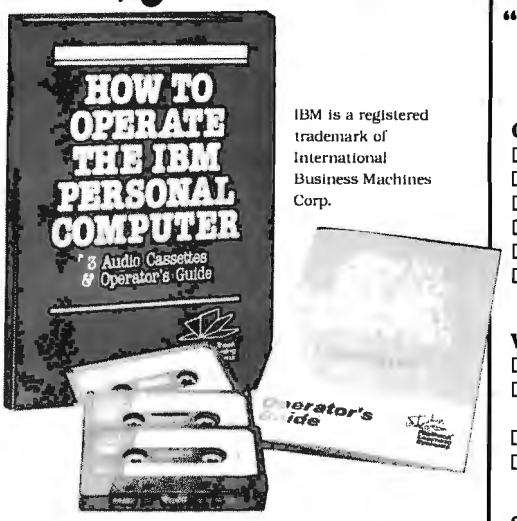

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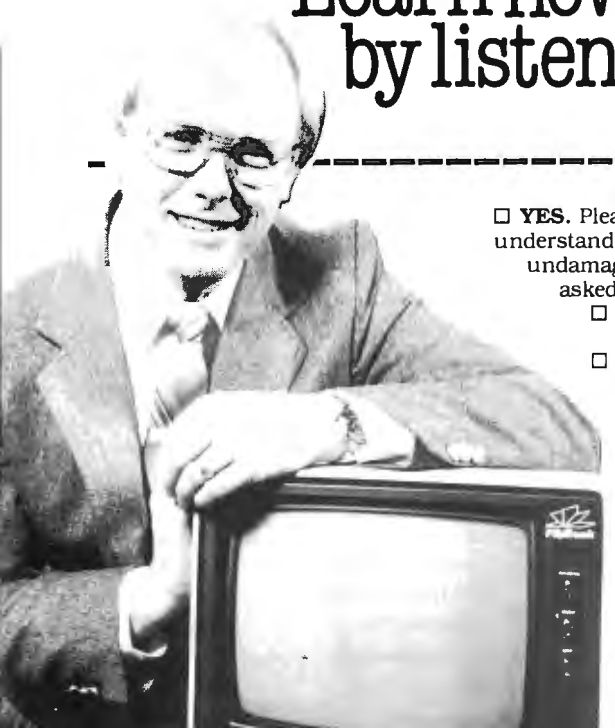

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tomatically searches for a boot record on the hard disk. As supplied by IBM, a pc's ROM lacks that little piece of code, so a pc with only the standard ROMs cannot boot off a hard disk—external or internal.

Buried deep within the new IBM *Technical Reference* manual (version 2.02) that was released in support of both the XT and the updated pc (the pc with the 256K motherboard) is an interesting piece of information that bears directly upon the issue of booting from an add-on disk. The manual describes a rather delightful feature that IBM added to the ROM code when it moved to the 256K motherboard. On all XTs and newer pcs, a short piece of initialization code has been added; this code causes the pc to go browsing through certain memory locations (locations 0C8000H to 0F4000H), looking to see if any ROMs are installed therein. If the BIOS finds a valid ROM installed within that address space, it branches to the code in that ROM.

Suppose that new ROM happens to contain a device driver for a hard disk, as well as code that would let the pc boot off the hard disk. The new ROM needs some way of telling the BIOS to use its (the new ROM's) code for booting, rather than the code in the standard ROM BIOS. And, fortunately for us, such a way exists.

When the BIOS executes the boot code, it does not jump directly to the code that will read the boot record; it instead executes an internally generated interrupt, which causes it to jump to the address (and execute the code) contained in location 64H, the memory location in the interrupt table that points to the location of the bootstrap loader. In the normal course of events, the BIOS itself will have loaded that location with an address that points right back into itself somewhere, that "somewhere" being the location of the boot code in the standard BIOS. But it's a very easy task for the newly added ROM, when given control by the BIOS, simply to change the pointer to the bootstrap loader in the interrupt table, so that instead of pointing back into the ROM BIOS it points to boot code in the new ROM. Having done that bit of initialization of its own, the new ROM can return control to the BIOS (which still has to finish the initialization procedures), secure in the knowledge that when it comes time to boot, the boot code in the new ROM will be substituted for the standard boot code in the ROM BIOS.

When a manufacturer sells you an add-on hard disk, he must include device driver software (a device driver is simply some code that the pc will execute whenever it needs to access the hard disk). What all the discussion of the previous paragraphs boils down to is this: If the manufacturer burns his device driver into a ROM, adds some boot code and a little initialization routine, and gives you the ROM along

with the disk, you'll have a hard disk you can boot from. Considering that he's got to supply you the device driver in any case, and that ROMs are fairly cheap, that would be a very small expenditure of time and money for a very sought-after feature.

So why aren't more manufacturers offering it? They probably will. After a few manufacturers start offering self-booting hard disks, the rest will have to jump on the bandwagon to stay competitive.

And surprise: A few manufacturers already are offering self-booting add-on hard disks. For example, Maynard Electronics of Casselberry, Florida, offers a ten-megabyte internally mounted hard disk that comes complete with an EPROM; plug the EPROM into the motherboard, throw away your boot floppy, and power 'er up (look for a review of the Maynard disk in a future issue).

In the meantime, booting off a floppy disk in drive A doesn't seem all that bad—until you realize that every time you finish running a large program, the resident portion of DOS (that is, the part of the operating system that, once loaded, never leaves memory) goes back to that same floppy drive to reload the transient portion. And that can be a true pain. (The transient portion of DOS is the part of the operating system that may be overwritten by large programs, then reloaded when needed. See last month's column.)

Fortunately, DOS offers a solution to this problem. Unfortunately, the solution didn't work when we tried it last month. Fortunately, we got it to work this month.

The solution lies in a statement that can be placed in the configuration file. The configuration file is a user-supplied file that DOS reads when it is first fired up. Inside the file (which must be located on the boot disk and must be named Config.sys) are statements that tell DOS how to configure the system. The statement

DEVICE = WDRIVE.BIN

for example, tells DOS to look for a file called Wdrive.bin and load it as a *device driver*; a device driver is a program that conforms to several predefined standards and to which control is passed whenever DOS needs to access the particular hardware device that the driver program controls. DOS 2.0 cannot use the Great Lakes hard disk until the program Wdrive.bin is loaded.

Another statement that can be included in the configuration file is *shell* (this statement, unfortunately, bears the same name as Basic's *shell* command—to which it is otherwise entirely unrelated). Found inside a configuration file, *shell* tells DOS the name of the user-interface shell under which it will operate, and where to find that shell.

And what is the user-interface shell? Simply that portion of DOS with which you interact

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most directly. As an example, it's the shell that causes the prompt

A>

to be printed. The shell is also responsible for interpreting user commands, such as a request for a directory:

A>DIR B:

and, for that reason, is also known as the command interpreter.

You may recall earlier the implication that there are two parts to DOS: a part that's always resident and a transient portion that may be overlaid. The transient (overlayable) portion is the command interpreter, a program that's quite familiar to you as Command.com. When you terminate a program that's been running from the hard disk and your pc insists on accessing the A drive, DOS is simply trying to reload Command.com. The command interpreter's default location is drive A, and its default name is Command.com. So unless you tell it otherwise, DOS will always try to reload Command.com from drive A—no matter how much money you paid for your hard disk.

You can tell it otherwise by means of the *shell* command. *Shell* specifies both where an alternate shell will be found and what its name is. According to the DOS 2.0 documentation, you can specify an alternate shell by including the following line somewhere in the file Config.sys:

SHELL =
[D:][PATHNAME]FILENAME

where *d:* is an optional drive specifier.

That would certainly appear to solve the problem: Simply put Command.com on the hard disk, perhaps in a directory called \System, then include in your configuration file the statement

SHELL =
C:\SYSTEM\COMMAND.COM

And, of course, if you've tried that, you know it doesn't work. Don't blame the programmers, though; blame the document writers. (On second thought, blame them both.)

What the command *should* look like is:

SHELL =
C:\SYSTEM\COMMAND.COM
C:\SYSTEM /P

The first parameter *(c:\system\command.com)* tells DOS that the command interpreter it's to use is called Command.com, and that the first time it is loaded, Command.com will be found in the directory \System, which is located on drive C. The second parameter tells DOS that when it comes time to reload Command.com, the file will be found (again) on drive C, (again) in the directory \System. And the switch, */p*, tells DOS that this name and location for the command interpreter are to become permanent, to be changed only when DOS is rebooted. Omitting the switch in this case is tantamount to omitting the whole statement.

If you're familiar with the *set* environment command (see "System Notebook"), you may know that the shell pathname is included in the environment as a parameter of the form:

COMSPEC=C:\COMMAND.COM

Don't bother trying to bypass the configuration file by setting the Comspec environment parameter directly. While this would seem to be the only logical and consistent place to store the shell parameter (it is, after all, where all other programs can look to determine the shell name and location), DOS keeps its own record elsewhere. Maybe this will be cleaned up in a future revision of DOS 2.0. With any luck, the revision will also correct the documentation of the *shell* command.

One note about using the *shell* statement in a configuration file: It's a good idea to include the shell's directory name in the path. In the example just shown, the path might read:

PATH=\SYSTEM

More on Hard-Disk Incompatibilities. As noted last month, you'll have trouble running "foreign" (translate non-IBM) operating systems with any external hard disk that interfaces via a loadable device driver. That's because, rather than going through the device driver (which can't be loaded, since it was written for PC-DOS), the foreign operating system must make some assumptions about the hardware; the most significant assumption that the OS makes is that the hardware looks like an XT. The problem can of course occur with application software: Any software that makes assumptions about the hardware and then attempts to access the hardware directly, rather than going through the OS, is going to run into the same problem as the foreign operating systems. That's one of the principal reasons Alan Boyd, in his "System Notebook" column, has been so opposed to programs that make end runs around the operating system and access the hardware directly.

As with operating systems, there is some subset of programs that bypass all or parts of the operating system, sometimes out of real necessity, frequently out of imagined necessity. One of those programs is HardLook, Peter Norton's utility for examining the XT's hard disk. This program doesn't work with the Great Lakes drive. We'll mention any other incompatibilities we run across as time goes by. ▲

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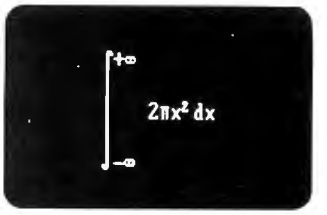

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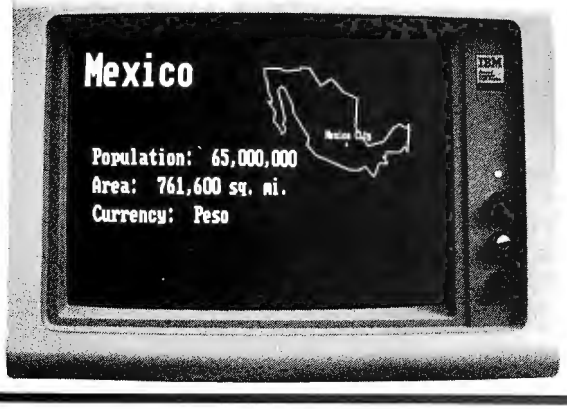

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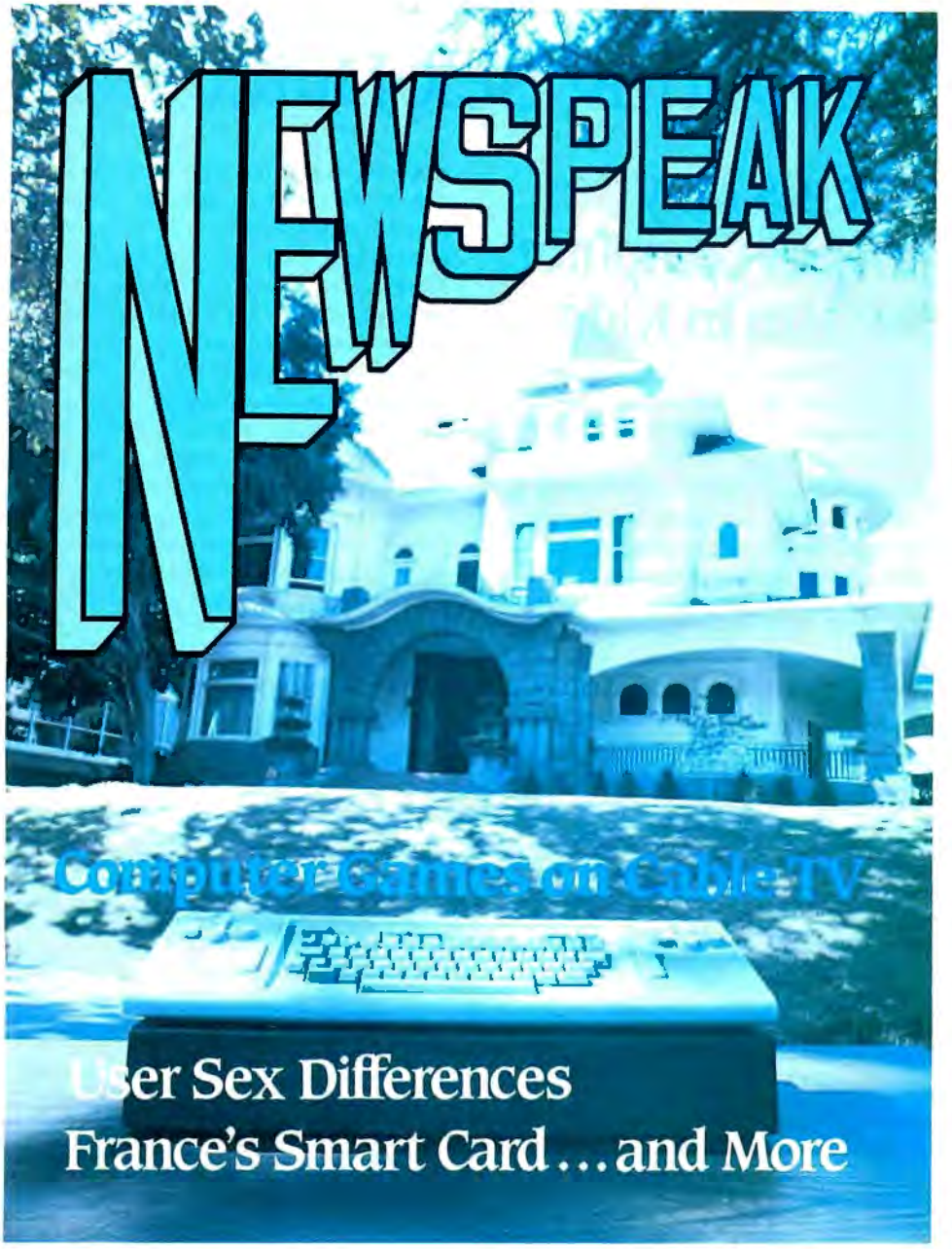

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"I don't know; let's have a look at the TV listing. There are two horror movies, a country western concert, and the usual stuff. Nothing for me."

"I think I'll play Zork *then. Switch to that, please."*

"I think I'll read a magazine."

On the eve of the year 1984, forget about test-tube babies, Big Brother, newspeak, and doublethink. Get ready instead for the beginnings of what should become a big business—cable- and telephone-based computerized information and entertainment networks for the home.

They have names like The Games Network, GameLine, and TeleLearning. Soon these networks may be part of daily home life for many people. And that's not just people living in affluent suburban homes. With cable television, it's possible to reach hordes of sensation-hungry middle-class apartment

GOTO page 266, column 2

The keyboard in the picture above is one component of The Games Network's Window. The mansion is the Los Angeles headquarters of The Games Network.

A New Scheme For Locking Up Software

In the seemingly never-ending controversy over the illegal copying of computer software, the phrase "protection scheme" is often heard, but not many people in the industry—publishers, authors, everyday consumers, and certainly not pirates—profess much liking for the various protection schemes that have been used in the past. And yet the idea that software can in fact be locked up tenaciously hangs on.

The fact is, just as soon as a new scheme is developed, the truly dedicated pirates start hacking away at it. And they always break it. Some observers feel that it will always be impossible to create a completely unbreakable scheme. An alternate plan is to make the economics of the situation work to the advantage of the software publisher.

In response to this notion, three Israeli scientists have proposed a new protection scheme. The scheme involves the deliberate use of "weak bits" in special sections of a program.

A weak bit is a bit that is sometimes read as a 0 and sometimes as a 1. The idea is that personal computer owners will not be able to duplicate the weak bits on their own machines—unless they modify their disk drives—and the software will not run without them.

This protection method was devised by Adi Shamir, a mathematician at the Weizmann Institute of Science, and his students, Amos Fiat and Yossi Tulpan. Shamir proposes that hundreds of weak bits could be intentionally written on certain tracks or sectors of a disk. The special sections—called coupons—would be chosen by the software designer and hidden within the program.

When a user boots a program that incorporates this scheme, the computer is instructed to check for weak bits by reading over the coupon several times. The weak bits show up sometimes as 0s and sometimes as 1s, and the computer checks to make sure there is no consistency in the way the coupon is read.

This scheme would prevent users from copying programs because disk drives are normally incapable of introducing weak bits. If a user tried to copy the coupon, the result would be a copy containing only normal bits—unambiguous 0s and 1s introduced more or less arbitrarily by the computer whenever a weak bit was encountered.

GOTO page 264, column 2

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Computing Sex Differences

Parents May Be Root of Computer Sexism in Kids

Why is it that women of all ages are lagging behind the male population in embracing the computer revolution? Does it begin in the school and home? And, if it does, who is to blame—industry, the schools, parents?

Two Stanford University psychologists, Irene Miura and Robert D. Hess, conducted three studies of computer use among schoolchildren and found that girls begin falling behind at an early age. Their survey of eighty-seven children—boys and girls from five to eight years of age—showed that only boys were owners of home computers at these early ages. Though the situation changes when students reach junior high school, the boys still outnumber the girls as owners two to one.

This first survey also revealed that there are definite sex differences in the amount of time spent using home computers. Miura and Hess found that, in a typical computer-owning family, the son spent two to three hours per day programming and playing games, the father used the computer regularly for business, and the mother and daughter didn't use it at all.

Miura and Hess's survey of twenty-three computer camp directors—including information on over five thousand campers—found that girls make up 27 percent of enrollment in beginning and intermediate classes. The proportion drops to 14 percent in the advanced classes and to 5 percent in the highest level courses. An interesting pattern was uncovered by Miura and Hess—female enrollment in computer camps decreased as the cost of the camps increased—an indication that many parents are more aggressive in encouraging boys to tackle computing.

In their third study, Miura and Hess had children and adults rate seventy-five software titles according to whether they were of greater interest to boys or girls. Adults and children agreed that only 5 percent of the titles were of more interest to girls, while more than one-third of the titles were of greater interest to boys.

Will women in the future be left out of the computer age because of childhood sexism?

Schools, parents, and industry must all take blame for the failure to make computing more attractive to the young female population of this country. The scene seems to be changing for the better, but slowly. Altering the perceptions of parents—those who believe that computers are naturally the province of boys—would help immensely. True, the lack of software specifically designed for young girls is more than noticeable, but the lack of opportunities for young girls to encounter present software—which often transcends sex differences—is an even more serious problem. DH

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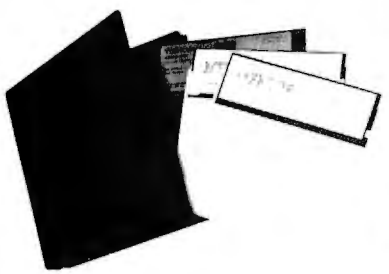

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Boston Science Museum To Open Computer Center

Boston continues to be the site of many exciting developments in the computer revolution. Now the city's Museum of Science, which is situated alongside the Charles River, is poised to make its contribution—which, when combined with the city's experience so far, could make Boston the most computer-literate city in the world.

In January 1984, the museum will open its new computer center. By offering instruction and information in various aspects of computing, the center will seek to bring Boston's children (and adults) into the information age. Last year the museum drew 820,000 visitors, according to museum officials, including some 175,000 schoolchildren and teachers.

Two phases are planned for the computer center at present. Scheduled to begin early next year are workshops on computer programming and education. The museum has set up two classrooms in twenty-five hundred square feet, adjoining the main building.

The center plans to offer instruction in Logo, Basic, and Pascal, as well as special courses on computer awareness. Apple Computer and several other major computer companies have already agreed to aid in this effort by donating computers.

The center also will establish a resource library of hardware, software, and printed material. An annual conference will disseminate school-based programs to educators. Likewise, the Lowell Charitable Foundation is donating $50,000 a year for five years to the center, specifically for the training of public-school teachers in the use of computers in education.

Although programming will be taught, the primary thrust of the center will be toward the practical applications of computers. The assistant director of education at the museum, Charles H. Howarth, is responsible for implementing this program.

"Many people are going to realize that they wish to be computer users, not programmers," Howarth says. "For these people we will provide instruction in such areas as word processing, database management, home instruction, and spreadsheet utilization." According to Howarth, the cost will be less than fifty dollars per eight-hour course.

Phase two will see the center expand to six thousand square feet, including another classroom. The Museum of Science is so enthusiastic about the center that the projected expansion will even cannibalize some of the museum's precious parking structure. In downtown Boston, where parking is scarce, this signifies the height of commitment.

The computer center will get a boost if a proposed joint venture with the Massachusetts Institute of Technology occurs. This would involve the training of high school science teachers in computer simulation and modeling.

The center also has approached IBM for support, specifically hardware. The museum currently houses the IBM "Mathematica" exhibit, which, until last year, resided in Chicago's Museum of Science and Industry. The fifteen-hundred-square-foot, twenty-five-year-old exhibit explains the mysteries of mathematics in a number of ways. Whether or not IBM helps support the center, schoolchildren will tour the exhibit and then be able to experiment at the computer center with what they learn.

The center will explore all aspects of the computer age, says Howarth. "We want to get closely involved with the local research community. The areas of study will include software evaluation and cognitive psychology." These and other projects could affect the development of educational software.

Boston's Museum of Science is not waiting for computers to be stuck in some future "Late Twentieth Century" wing. By bringing present technology to the people of today, the museum is trying to build a better future. RRA

Scheme

continued from page 261

Needless to say, truly dedicated pirates are probably already busy messing with their disk drives to make them copy weak bits. Central to Shamir's plan is the assumption that most pirates won't risk screwing up their hardware for the challenge of breaking a protection scheme—or for any other reason. That's a start to an argument, but it's never wise to underestimate the resourcefulness of pirates. If Shamir's method were used widely in the industry, more likely than not there would soon be a whole lot of modified disk drives floating around.

The jury is still out on the usefulness of Shamir's scheme. The most important factor in any use or nonuse of software protection—how much the retail price of the software would be affected—is still unknown. DH

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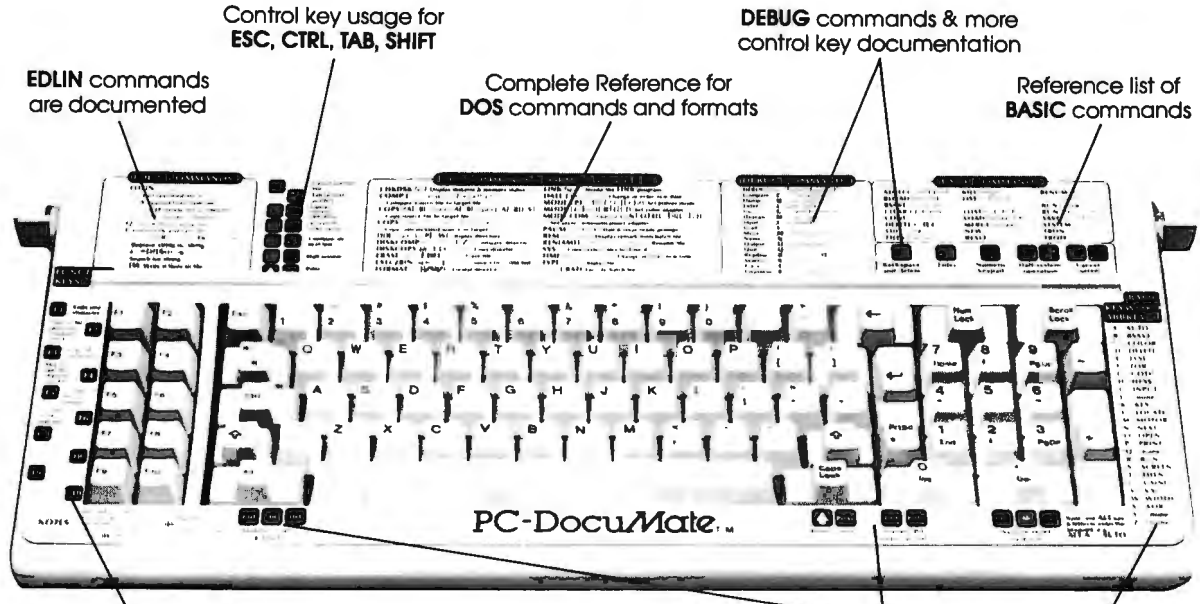

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Cable TV

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and condominium dwellers in urban and suburban areas.

The idea of bringing computer programming directly into the home has been around awhile and has spawned several ventures since microcomputers first appeared seven years ago. Personal computer owners have had the Source, CompuServe, Dow Jones News/Retrieval Service, and countless local bulletin board systems to broaden their computing horizons. Offering everything from games to financial news, these services have done well—though they've by no means taken the country by storm.

Many people believe that telecommunications is the one capability that will ensure the microcomputer a place in the home. Roughly analogous to a phonograph when standing alone, a personal computer hooked up to an information or entertainment network is more akin to a radio. It's safe to say that neither game machines nor personal computers have become as important as a radio is to the average household. But as prices come down, peformance goes up, service improves, and better software appears, personal computers should find a place in many millions of American homes.

Right now, though, the home market is confusing to say the least. Increasingly, the public has a choice between purchasing home computers, renting them, or getting most of the same functions through videotex or a like service. A year ago, Atari, Mattel, and Coleco made millions. Now these companies are close to foundering because of consumers' disenchantment with low-priced home arcade games. The new year looks to be an important testing time, a time when trends will be identified and acted upon.

A look at some of the coming games and entertainment services, both cable- and telephone-based, reveals a number of different approaches to bringing computer technology to the home. Though electronic mail, electronic banking, and other nonentertainment applications are starting to appear on the scene—and are perceived as the ultimate selling point of telecommunications services—it's games that are likely to capture the most public attention at first.

What could be easier for game players than renting a terminal and getting a steady stream of games from the local cable company? There are no cartridges or floppy disks to worry about and no difficult questions to ponder, such as, "Is this game worth driving ten miles and spending thirty dollars."

And if games can be sent over the cable, why not other kinds of computer programming? The only trick would be getting the proper hardware into the hands of end users. At some point—to realize the usefulness of home finance, word processing, database, and educational applications—users are going to require the ability to save data.

A cable programming company in Los Angeles—The Games Network—has started a service through which users can rent a game-playing device and receive games over cable television. Eventually, the game device will be equipped to handle more serious home computer applications.

The Games Network will begin operation in southern California's Orange County early next year. From the land of Goofy and Reggie, The Games Network will branch out over the country and eventually Canada and the United Kingdom. Close to five hundred cable companies have expressed interest in carrying The Games Network.

The particulars of The Games Network's scheme are impressive and it's easy to see why the company's initial stock offering was a success—the price of a share jumped from $2 to $5.25 the first day—even before the company had provided service to a single regular customer.

This past fall, the system was test-marketed on the Group W Cable system in Fullerton, California. Officials of the cable company reported positive subscriber reaction to the programming offered and few technical problems.

Games Network users receive two pieces of hardware—a full keyboard and a control box that includes 64K of RAM. The keyboard has a separate microprocessor and two angled, bar-shaped game keys on each end. Users subscribe to the service through the cable company, which, in turn, installs (and services) The Games Network hardware.

The whole unit is known as The Window. It has a three-voice sound generator and can produce four thousand colors, with standard Apple resolution. The unit will support both switch-type (Atari, Commodore) and potentiometer (Apple/IBM) joysticks, which will most likely be offered to customers by the cable companies.

Each month, twenty games are available through the service. Users pay a one-time installation fee that depends on the individual cable company and then sixteen dollars a month to subscribe.

The games? Try *Snack Attack*, *Lode Runner*, *Aztec*, *Wizardry*, and *Zork*. The founders of The Games Network were raised on Apple II games. And it's these games—the ones Apple owners have known about

GOTO page 268, column 2

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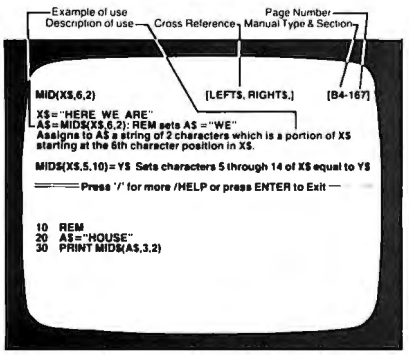

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Cable TV

continued from page 266

through the long and weary years of cartridge-mania—that The Games Network is banking on.

In theory, the game makers that sign up with The Games Network—already signed are Broderbund, Edu-Ware, Funtastic, and forty others—should benefit from the exposure their products receive on the service.

The Games Network says its relationship to the software industry is roughly analogous to that of radio to the recording industry. One difference is that the users of The Games Network cannot record the software that comes over the cable.

In other ways, the radio analogy seems apt—at least until experience proves it otherwise. The Games Network provides "airplay" of sorts for commercially available computer games. Once users get a look at what computer games (and eventually other software) are like, presumably they'll think harder about buying the real thing.

The Games Network is conservative in its expectations for the first year of operation. Subscribers will number in the hundreds of thousands, not millions, according to a company spokesman. But the fact is—through the wonder of cable television—The Games Network could really take off.

The one previous attempt to provide an interactive game-playing service via cable television has stood as an example for The Games Network. An example of what not to do.

A joint venture between Mattel and General Instrument, PlayCable began in thirteen cable systems in 1981. Of the six hundred fifty thousand cable subscribers who have access to PlayCable, fewer than 3 percent have signed up for the service.

Two factors account for the poor showing of PlayCable. First, the service requires subscribers to purchase Mattel's Intellivision game player for a couple of hundred bucks; and second, the games themselves are not good enough to attract a large audience. Certain fans of the system defend PlayCable, citing the hours and hours they've used it, but so far there haven't been enough of these aficionados to make the enterprise a moneymaker.

While The Games Network is attacking the home market through cable, a whole slew of companies are getting ready to attack through the telephone lines.

Control Video Corporation's (CVC) GameLine was created by William von Meister, founder of the Source. Like the Source, GameLine requires a television set, a telephone, and a modem. Consumers who already own an Atari VCS or a compatible video game console can purchase the GameLine Master Module (the modem) and have access to the large library of 4K games currently available for the Atari 2600.

The Master Module should sell for around sixty dollars, and a one-time membership fee of fifteen dollars will be charged when members first connect to the system. Among other things, that fifteen dollars will get you a year's free subscription to *GameLiner* magazine, a regularly published listing of games available on the system that includes instructions for the new games introduced each month.

GameLine offers six games a month. Once a user has entered a personal I.D. number and game selection, it's a matter of dialing up the service with the Master Module (a local call from a major metropolitan area; toll-free from other locations). Currently, each game play session (multiple plays of a game) costs one dollar.

Like the folks at The Games Network, the CVC organizers hope to deliver much more than games in the future. Soon, the company should be marketing modems that will plug into the game I/O port of most home computers and will deliver true computer games. Eventually the company will offer a whole line (pun intended) of services, with self-explanatory names like MailLine, SportsLine, StockLine, NewsLine, InfoLine, and BankLine.

Coleco and AT&T have announced that they are jointly developing a game service. The project is similar to GameLine—games are downloaded by modem into personal computers or video-game systems. Coleco will supply the game software.

Atari is readying a low-cost modem for use with its computers and game machines. The telecommunications services the company plans to offer, if any, have not yet been announced.

Undoubtedly many more schemes will surface in the new year. The race to bring telecommunications to the home is on. The winner of the race—if there is one clear winner—will likely be the group that hits upon the way to make it as easy as possible for consumers to acquire and use a system. Televisions wouldn't sell in the tens of millions if consumers had to thread videotapes into players and run prime time programs themselves.

"I'm tired of playing Zork, *Henry. The set's all yours."*

"I'm tired of reading magazines. I think I'll do our finances. Switch the channel for me, please."

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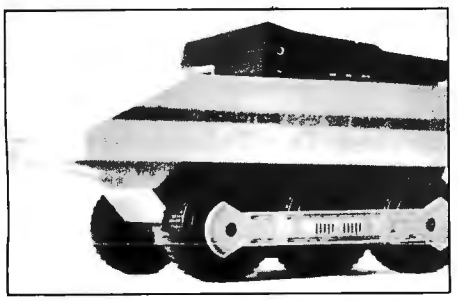
ΔShow of Shows. The 1984 International Winter Consumer Electronics Show (CES) will invade Las Vegas January 7-10. More than twelve hundred exhibitors will lay waste to more than seven hundred thousand square feet of exhibit space in the Las Vegas Convention Center, the Convention Center annex, the Hilton Hotel, and the Riviera Hotel. An industry trade show not open to the general public, CES will nonetheless attract upward of seventy thousand attendees.

ΔPersonal Robot Get-together. The first International Personal Robotics Congress will be held April 13-15, 1984, in Albuquerque, New Mexico. Two days of the gathering will feature technical sessions on the personal robotics field, covering such topics as technology, control languages, definitions and terminology, legal aspects of robots, social implications, marketing, and training. An exhibit area will be open to the public all three days. The organizers of the affair are encouraging people who have built their own robots to enter their creations in various planned competitions during the congress. The personal robot industry is still in its early childhood and many exciting designs and innovations are coming from hobbyists. The congress is hoping to bring together industry and individual robot experimenters. For more information, contact the International Personal Robotics Congress in Lakewood, Colorado.

ΔLap Robot. Gainesville, Florida-based Bingel Robotics has brought out the RMP 2000—a lightweight, mobile, tanklike robot—that is compatible with the Timex/Sinclair 1000, ZX 81, and ZX 80 computers. The RMP 2000 is programmable with Basic and



includes sample programs for exploring certain artificial intelligence experiments. Equipped with two dc drive motors, the RMP 2000 basically moves around at your command and is meant to be an educational robotic device. The RMP 2000 weighs four pounds and can carry a maximum of four pounds on its flat top. It can travel both forward and backward at a top speed of thirty-five feet per minute.

ΔOld Man of the Sea. Proteus Robot Corporation, based in Niwot, Colorado, has developed a "black box"—a general-purpose process controller—designed to run with S-100-style microcomputers. Called Proteus, the unit is meant to be an interchangeable brain that will fit in a line of robot "shells" that the company is planning to produce. The first robot shell, called Koodar, is scheduled to be released late this year or early next. Koodar will be mobile and low to the ground with a large flat surface on top. Taking advantage of the Proteus's Motorola 68000 microprocessor, Koodar will be able to perform such tasks as vacuuming rugs (with a piggyback vacuum cleaner on top). The makers say it can also polish floors and carry loads from point to point in factories. The company says it's investigating home security applications.

ΔEven More Robot News. RB Robot Corporation, makers of the RB5X Intelligent Robot, have signed an OEM agreement with the German robot company, Rainbow. The agreement calls for the Hamburg, West Germany-based Rainbow to purchase electronics and voice assemblies from RB Robot, which is based in Golden, Colorado. The parts will be used to begin the manufacturing of Toby, a home robot that resembles RB5X in both design and function. Toby will have the same RS-232 serial interface capability of RB5X, as well as most other features of the original, but it will have a slightly different exterior.

ΔIndustrial Strength Control. AT&T Information Systems and Bailey Controls, a division of Babcock & Wilcox, have announced an agreement to cooperate in linking communications technology with process control systems, numerically controlled machines, mainframe computers, engineering automation systems, and personal computers. The joint venture was formed to serve the growing need in the industrial marketplace for factorywide, optimized, computer control of automation processes, communications, and energy management. According to Bailey Controls president M.A. "Bud" Keyes, "We see an emerging trend in the industrial marketplace where, instead of distinct processes being controlled separately, the entire facility is optimized for low production cost, energy conservation, and high product quality."

ΔFrance Deals Out Smart Cards. Intelmatique, the international marketing arm of the French telecommunications administration, announced that the French Ministry of Post and Telecommunications will issue one and a half million Multi-Service Smart Cards in 1984. The smart card is the size and shape of a credit card and has one or more embedded

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computer chips that are programmable and capable of storing data. According to Intelmatique, the Multi-Service Smart Cards will have four uses: pay telephoning, telebanking and telepayment for products ordered electronically by videotex, pay television, and as payment mechanisms for delegates attending conferences and special events at permanent exhibition/convention sites. In addition, the cards will also be used by some savings account customers of CCP (French postal bank) and the Post Savings Bank for transferring funds and paying bills. The smart cards will allow customers of CCP and members of Carte Bleue to exchange services. For videotex applications, the smart card is compatible with the Minitel terminal—a standalone terminal used in France's electronic telephone directory and Teletel videotex services.

Δ2001: A Compact Disk Odyssey? Technology Opportunity Conference presents the First International Conference on the Future of Optical Memories, Videodiscs, and Compact Disks to the Year 2000 at San Francisco's Sir Francis Drake Hotel December 5-7. The conference will specifically address such issues as the future needs of end users vis-a-vis optical memory, interactive videodiscs, and compact disk systems. A series of talks and presentations by experts in the industry are planned for the three-day affair. For more information, contact the Technology Opportunity Conference headquarters in San Francisco, California.

Δ Twisting Cheese around the Clock. The word from Budapest, Hungary, is that Erno Rubik—inventor of that maddening, addicting Cube—is about to unleash two new mind-teasers, Rubik's Cheese and Rubik's Secret. Rubik's Cheese, a sort of multihued Gouda that works on the same principle as the Cube, should be available for international marketing early next year. Rubik's Secret is still just that—a secret. A teacher at the Academy of Applied Arts in Budapest, Rubik is now a millionaire in a country where the average wage is the equivalent of $100 a month. At home, his success is something of an embarrassment for the Communist government, although sometimes he is a source of national pride. Because of patent laws, taxes on his royalties are limited to 20 percent. In a land where personal success and individual enterprise are still not officially encouraged, 39-year-old Rubik is in a puzzling situation.

Δ Stockhunter: Adventures in the Financial Zone. If you missed the latest rash of 3-D films this summer, most of which were critically lambasted and fell flat at the box office, cheer up. There's always 3-D stock. View-Master International, purveyors of hand-held 3-D slide viewers for the past forty-five years, has made its initial public offering—850,000 shares of stock, each equipped with a special pair of viewing glasses. The 3-D certificates depict a globe, View-Master's logo, and the company name in red and blue. According to company officials, the 3-D effect is fairly flat, so you can still read the certificate without the special glasses.

ΔScotch Buy. A century ago, the first Industrial Revolution thrived in Scotland, where coal, steel, and shipbuilding were the big industries. Now the Central Lowlands of Scotland are becoming the site of another revolution, as the promises of the previous turnaround wane. In the last year or so, the area in Scotland from Ayr on the Irish Sea to Glasgow on the Clyde to Edinburgh on the Firth of Forth to Dundee on the Firth of Tay has become known as Silicon Glen. At last count, some 270 high-tech companies are pumping out a stream of computers, computer components, and programs. American giants like IBM, Motorola, NCR, and Hewlett-Packard have operations in the glen, and Nippon Electric has announced plans to build a new semiconductor plant in the town of Livingstone, west of Edinburgh. Economics is the main reason companies seek out the glen. Operating costs are about one-third lower than in the United States. With the decline of the coal and shipbuilding industries causing high unemployment in the area, the influx of high-tech companies couldn't have come at a better time.

Δ"I Married a Washing Machine." DeVon Smith is a junk dealer in Ellwood City, Pennsylvania. Recently, the Ellwood City Chamber of Commerce asked Smith to create three "robots" for a special fall promotion. Two of the "robots" were to be wed, while the third acted as best man. Smith bought some spray paint and small flashing lights and then raided his stock of junk. Jupiter Salvage, the groom, was given a washing machine agitator for a head, a washing machine tub for a body, vacuum cleaner hoses for arms, sewer pipes for legs, and Smith's own boots for shoes. The bride, Venus Scrappe, wore a used lace curtain for a skirt and matching veil; a water softener device placed on a dishwasher basket and a four-legged stool served as her body. The two robots were married on October 1, with Martian I as best man. After honeymooning in Pittsburgh's swankest public dump, the newlyweds settled down in an auto-wrecking plant in New Jersey. Happy holidays! ▲

Editor
David Hunter

Contributors
Roe R. Adams III, Dasher, Dopey, Daffy, and Snoozer

THE RIGHT TO ASSEMBLE

by Ray Duncan

The TALK Utility

This month's program, named TALK, is a "dumb terminal emulator" that can be used on any IBM Personal Computer equipped with the Asynchronous Communications Card. It allows your pc to function as a terminal for a modem or another computer system. TALK is a very unsophisticated communications program and doesn't support interrupts or cursor addressing, but in combination with a Hayes Smartmodem it is adequate for just talking to your S-100 microcomputer or to one of the dial-up bulletin boards or on-line database services. Even without interrupt-handling capabilities, it functions well at speeds of up to 2400 baud.

How To Use TALK. TALK will not function properly if the optional ANSI video driver is loaded, so make sure that the line *device = ansi.sys* is not present in the Config.sys file on your boot disk. Before loading the program TALK, you should use the PC-DOS *mode* command to initialize your serial port for the desired baud rate, parity, word length, and number of stop bits. You'll find a detailed discussion of each of these parameters in your PC-DOS manual, but suffice it to say that the following command line will set up a Hayes Smartmodem 300 properly for use with TALK:

```
A>MODE COM1:300,E,7,1
```

This command line directs PC-DOS to program the first Asynchronous Communications Adapter for 300-baud, even-parity, seven-bit characters, and one stop bit. Of course, you should substitute Com2: for Com1: if your Smartmodem is hooked to the second serial port. Note that when you first turn on your computer, PC-DOS automatically initializes the serial port to 2400 baud, no parity, one stop bit, and an eight-bit word, so if by some remote chance those settings are okay for your modem you can skip the *mode* command.

Now, you are ready to communicate with the remote system. Simply enter:

```
A>TALK
```

The TALK program will check to make sure your modem is hooked up and turned on. If it isn't, TALK will display the message "Check your modem" and return you to PC-DOS. If the modem status is okay, the screen will be cleared and flipped into reverse video (black on white). The reverse video will always serve to remind you while you're using TALK that you aren't giving commands to PC-DOS or to a program running on the IBM pc, but rather to a program running on a remote system.

If you are using a Smartmodem, you can give a "dial" command directly to the modem once TALK is active. TALK will establish the connection for you and, when the remote system has been reached, will display the message "CONNECT." For example, to set the communications parameters, invoke TALK, and dial up the computer bulletin board at (415) 538-3580, you would follow the sequence:

```
A>MODE COM1:300,E,7,1
A>TALK
AT DT 1 415 538 3580
```

After you see the word "CONNECT," you are on-line to the bulletin board software. Your pc is now functioning as a very expensive, classy-looking, thirty-character-per-second Teletype!

If you are using an acoustic modem instead of one of the direct-connect intelligent modems, you must dial up the remote system, get the answering tone, and put the handset into the earpieces on the modem before you invoke TALK. Otherwise you will get the "Check your modem" warning message.

When you've finished talking to the remote system, just push the escape key. The screen will be cleared and reset to normal video mode. TALK will then display the message "Goodbye" and return control to PC-DOS. Warning: Leaving TALK does not command the modem to hang up the line. If you don't turn off the modem, it will maintain the connection and run your phone bill up unmercifully.

Outline of the Program TALK. The general plan of the TALK utility is as follows:

1. Save the address for the final return to PC-DOS on the stack.

2. Make sure the modem is on-line. If it isn't, print an error message and exit. Otherwise clear the display and set it to reverse video.

3. Check to see if a character has been typed on the pc keyboard. If none has been typed, go to step 5.

4. If a character has been typed and it was an escape key, go to step 7. Otherwise, send the character out the serial port to the remote system. If the system is running in half-duplex, also send the character to the pc's video display (this will be discussed in more detail below).

5. Check to see if an incoming character from the remote system is ready on the serial port. If no character is there, go to step 3.

6. Read the character from the serial port and send it to the IBM pc's video display, then go to step 3.

7. The program reaches this step when the operator pushes escape on the IBM pc's keyboard. The display is cleared and set back to normal video mode. TALK prints "Goodbye" and returns control to PC-DOS.

Structure of TALK. Like the two programs in last month's column, TALK is written for assembly into an .Exe file. It consists of a Code Segment containing all the executable machine instructions for the program, a Data Segment holding various variables and text messages, and a Stack Segment that's used as a scratch area by the machine's PUSH, POP, and CALL instructions.

Within the Code Segment, there is a "main" procedure named TALK, which can be viewed as the master control for this program. There are also a number of small subroutines that handle character input/output between the TALK program and the pc's keyboard, video display, and serial communications adapter. These smaller subroutines are somewhat more complicated than is actually necessary for successful operation of TALK, but they have been designed to be general in nature so you can easily incorporate them into other programs of your own design.

The essential subroutines are eight in number and have names that correspond to their function, to wit:

COM_STAT. Get the status of the communications port (in other words, see if a character is waiting to be input).

COM_IN. Read (input) a character from the communications port.

COM_OUT. Write (output) a character to the communications port.

PC_STAT. Get the status of the pc's keyboard (that is, check to see if a key has been pressed).

PC_IN. Read (input) a character from the pc's keyboard

PC_OUT. Write (output) a character to the pc's video display.

CLEAR. Clear the screen and set it to the desired display mode.

HOME. Put the cursor in the upper left corner, known as the "home position."

A Closer Look at TALK. Over the past few months, this column has presented several short utilities as a means of illustrating use of the various ROM BIOS drivers that are built into the IBM pc. This month's program, no exception, is designed to show you how to exploit the serial port driver that's present in the ROM.

The proper name of the ROM driver is RS232_IO, and the code for it is listed on page A-22 of the *Technical Reference* manual version 2.0. The driver provides four services: It initializes serial port, reads serial port status, transmits character to serial port, and receives character from serial port (see table 1). This is a relatively short, simple driver; try reading the source code in the technical manual as a learning exercise; it's an example of how all the ROM BIOS drivers are structured.

Turning now to the internal workings of the TALK program, we encounter several commands and constructs that we have not used in previous months' columns. On line 3, the .LFCOND statement tells the assembler to list those parts of the source code that are not actually assembled because a conditional statement has been evaluated as false. Conditional statements are extremely handy for creating programs that can be assembled for different environments, and in a few moments we'll see an example of how they are used.

Lines 13 through 15 use the EQU operator to assign symbolic names "cr", "lf", and "esc" to the corresponding ASCII codes; these instructions serve only to make the assembly source code more readable.

Another use of the EQU statement is shown in lines 17 and 21. Here we are assigning names to values we are likely to change in different assemblies of the program. By *equ*ating the real value to a symbolic name at the beginning of the program, and by subsequently referencing that value only by its symbolic name, we make it much easier to modify the program later.

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Lines 84 through 90 are particularly interesting. We use the conditional statement IF ECHO to tell the assembler whether to process the subsequent source code lines up to the next ENDIF statement. If the symbol ECHO was equated to a nonzero value in line 17, it will be evaluated as true, and lines 87, 88, and 89 will be assembled into executable machine code. If ECHO is false, lines 87 through 89 will be ignored. In fact, if we hadn't included the .LFCOND statement at the beginning of the program, these lines wouldn't even have appeared on the listing. You can read more about conditional assembly on pages 5-44 to 5-47 of the *Macro Assembler* manual, although you may still find that a little heavy going at this stage.

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AX = status (see table 3)
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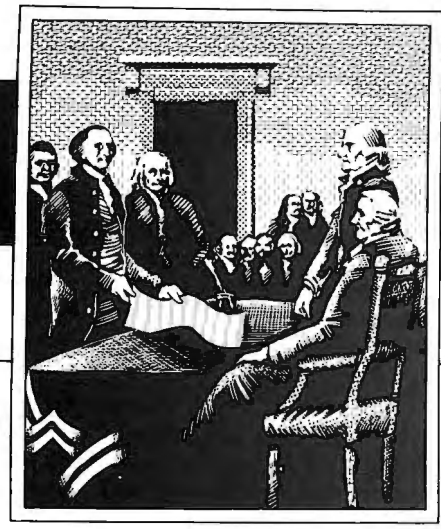
Call with:
AH = 1
AL = character
DX = communications port number (0 or 1)
Returns:
AX = status if bit 15 is not set
If bit 15 is set, the character could not be sent.
Function 2—Read Character from Communications Port
Call with:
AH = 2
DX = communications port number (0 or 1)
Returns:
AL = character
AH = bit 7 set if serial port timed-out
otherwise, bits 1, 2, 3, 4,and 7 are as
described in status request
Function 3—Status Request
Call with:
AH = 3
DX = communications port number (0 or 1)
Returns:
AX = status

Table 1: Functions available from the ROM BIOS Serial Port driver through software interrupt 14H.



THE RIGHT TO ASSEMBLE

by Ray Duncan

The TALK Utility

This month's program, named TALK, is a "dumb terminal emulator" that can be used on any IBM Personal Computer equipped with the Asynchronous Communications Card. It allows your pc to function as a terminal for a modem or another computer system. TALK is a very unsophisticated communications program and doesn't support interrupts or cursor addressing, but in combination with a Hayes Smartmodem it is adequate for just talking to your S-100 microcomputer or to one of the dial-up bulletin boards or on-line database services. Even without interrupt-handling capabilities, it functions well at speeds of up to 2400 baud.

How To Use TALK. TALK will not function properly if the optional ANSI video driver is loaded, so make sure that the line *device = ansi.sys* is not present in the Config.sys file on your boot disk. Before loading the program TALK, you should use the PC-DOS *mode* command to initialize your serial port for the desired baud rate, parity, word length, and number of stop bits. You'll find a detailed discussion of each of these parameters in your PC-DOS manual, but suffice it to say that the following command line will set up a Hayes Smartmodem 300 properly for use with TALK:

```
A>MODE COM1:300,E,7,1
```

This command line directs PC-DOS to program the first Asynchronous Communications Adapter for 300-baud, even-parity, seven-bit characters, and one stop bit. Of course, you should substitute Com2: for Com1: if your Smartmodem is hooked to the second serial port. Note that when you first turn on your computer, PC-DOS automatically initializes the serial port to 2400 baud, no parity, one stop bit, and an eight-bit word, so if by some remote chance those settings are okay for your modem you can skip the *mode* command.

Now, you are ready to communicate with the remote system. Simply enter:

```
A>TALK
```

The TALK program will check to make sure your modem is hooked up and turned on. If it isn't, TALK will display the message "Check your modem" and return you to PC-DOS. If the modem status is okay, the screen will be cleared and flipped into reverse video (black on white). The reverse video will always serve to remind you while you're using TALK that you aren't giving commands to PC-DOS or to a program running on the IBM pc, but rather to a program running on a remote system.

If you are using a Smartmodem, you can give a "dial" command directly to the modem once TALK is active. TALK will establish the connection for you and, when the remote system has been reached, will display the message "CONNECT." For example, to set the communications parameters, invoke TALK, and dial up the computer bulletin board at (415) 538-3580, you would follow the sequence:

```
A>MODE COM1:300,E,7,1
A>TALK
AT DT 1 415 538 3580
```

After you see the word "CONNECT," you are on-line to the bulletin board software. Your pc is now functioning as a very expensive, classy-looking, thirty-character-per-second Teletype!

If you are using an acoustic modem instead of one of the direct-connect intelligent modems, you must dial up the remote system, get the answering tone, and put the handset into the earpieces on the modem before you invoke TALK. Otherwise you will get the "Check your modem" warning message.

When you've finished talking to the remote system, just push the escape key. The screen will be cleared and reset to normal video mode. TALK will then display the message "Goodbye" and return control to PC-DOS. Warning: Leaving TALK does not command the modem to hang up the line. If you don't turn off the modem, it will maintain the connection and run your phone bill up unmercifully.

Outline of the Program TALK. The general plan of the TALK utility is as follows:

1. Save the address for the final return to PC-DOS on the stack.
2. Make sure the modem is on-line. If it isn't, print an error message and exit. Otherwise clear the display and set it to reverse video.
3. Check to see if a character has been typed on the pc keyboard. If none has been typed, go to step 5.
4. If a character has been typed and it was an escape key, go to step 7. Otherwise, send the character out the serial port to the remote system. If the system is running in half-duplex, also send the character to the pc's video display (this will be discussed in more detail below).
5. Check to see if an incoming character from the remote system is ready on the serial port. If no character is there, go to step 3.
6. Read the character from the serial port and send it to the IBM pc's video display, then go to step 3.
7. The program reaches this step when the operator pushes escape on the IBM pc's keyboard. The display is cleared and set back to normal video mode. TALK prints "Goodbye" and returns control to PC-DOS.

Structure of TALK. Like the two programs in last month's column, TALK is written for assembly into an .Exe file. It consists of a Code Segment containing all the executable machine instructions for the program, a Data Segment holding various variables and text messages, and a Stack Segment that's used as a scratch area by the machine's PUSH, POP, and CALL instructions.

Within the Code Segment, there is a "main" procedure named TALK, which can be viewed as the master control for this program. There are also a number of small subroutines that handle character input/output between the TALK program and the pc's keyboard, video display, and serial communications adapter. These smaller subroutines are somewhat more complicated than is actually necessary for successful operation of TALK, but they have been designed to be general in nature so you can easily incorporate them into other programs of your own design.

The essential subroutines are eight in number and have names that correspond to their function, to wit:

COM_STAT. Get the status of the communications port (in other words, see if a character is waiting to be input).

COM_IN. Read (input) a character from the communications port.

COM_OUT. Write (output) a character to the communications port.

PC_STAT. Get the status of the pc's keyboard (that is, check to see if a key has been pressed).

PC_IN. Read (input) a character from the pc's keyboard

PC_OUT. Write (output) a character to the pc's video display.

CLEAR. Clear the screen and set it to the desired display mode.

HOME. Put the cursor in the upper left corner, known as the "home position."

A Closer Look at TALK. Over the past few months, this column has presented several short utilities as a means of illustrating use of the various ROM BIOS drivers that are built into the IBM pc. This month's program, no exception, is designed to show you how to exploit the serial port driver that's present in the ROM.

The proper name of the ROM driver is RS232_IO, and the code for it is listed on page A-22 of the *Technical Reference* manual version 2.0. The driver provides four services: It initializes serial port, reads serial port status, transmits character to serial port, and receives character from serial port (see table 1). This is a relatively short, simple driver; try reading the source code in the technical manual as a learning exercise; it's an example of how all the ROM BIOS drivers are structured.

Turning now to the internal workings of the TALK program, we encounter several commands and constructs that we have not used in previous months' columns. On line 3, the .LFCOND statement tells the assembler to list those parts of the source code that are not actually assembled because a conditional statement has been evaluated as false. Conditional statements are extremely handy for creating programs that can be assembled for different environments, and in a few moments we'll see an example of how they are used.

Lines 13 through 15 use the EQU operator to assign symbolic names "cr", "lf", and "esc" to the corresponding ASCII codes; these instructions serve only to make the assembly source code more readable.

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Table 1: Functions available from the ROM BIOS Serial Port driver through software interrupt 14H.

EASY to USE "VISUAL SHELL" for DOS

the 1dir

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FUNCTIONAL FEATURES

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- SORT / DISPLAY files by NAME or EXTension
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- COMPATIBLE with DOS 1.10 and 2.00
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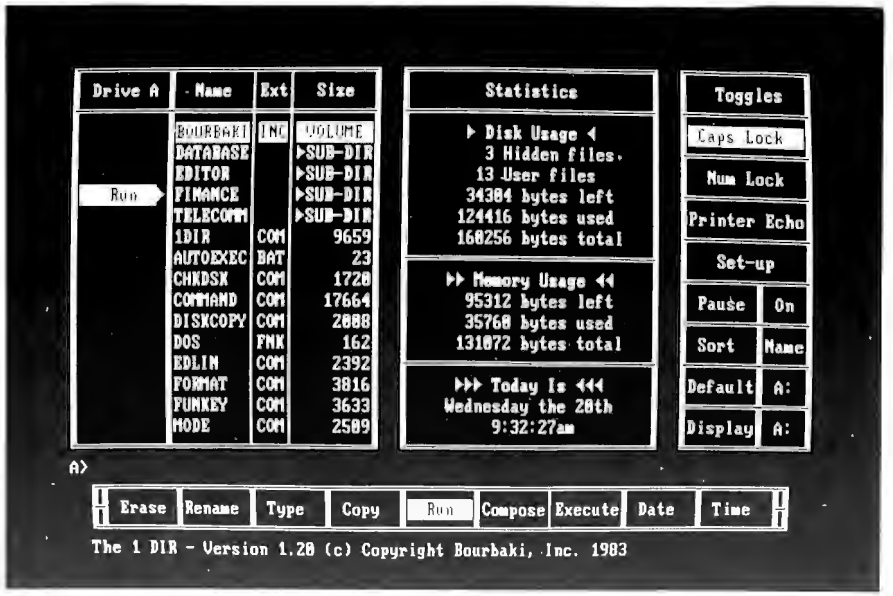
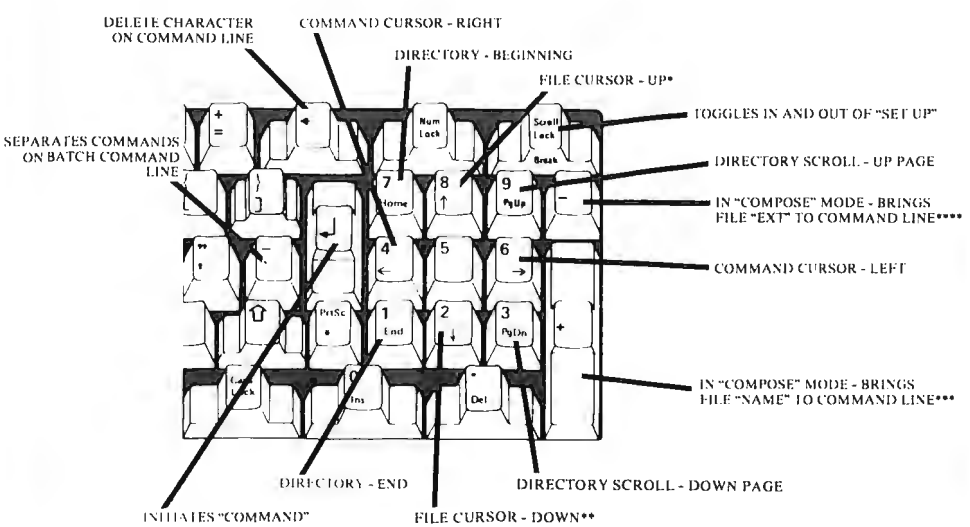
THE 1dir SCREEN



(ACTUAL PHOTO)

THE 1dir KEYBOARD



*IN "SET UP" - CURSOR UP
**IN "SET UP" - CURSOR DOWN
***IN "SET UP" - TOGGLES "PAUSE" ON OR "SORT" TO FILE "NAME"
****IN "SET UP" - TOGGLES "PAUSE" OFF OR "SORT" TO FILE "EXT"

NOTES:
1) TO EXIT TO DOS - ENTER "CONTROL C" (^C)
2) ESCAPE KEY (ESC) IS USED TO DELETE THE COMMAND LINE

port driver. With the aid of table 1, which spells out the various arguments and returned values for the driver function calls, you should find these three short pieces of code easy to understand. The COM_STAT routine checks for three kinds of I/O errors: timeout (which means the modem didn't respond within the allotted time), break detect, and framing error (basically a bit synchronization error). If one of these three is detected, a beep will be sounded. We'll ignore for the purposes of this simple program the other kinds of errors that can be detected (overrun, parity, and the like); that way, the program is less sensitive to how you set up your *mode* command.

Lines 171 through 218 contain the three subroutines that talk to the pc's keyboard and video display. These use the special PC-DOS function 6, known as "direct" or "raw console" I/O. Function 6 allows you to read and write *all* the ASCII codes, including control-break and control-C, without causing PC-DOS to take any special action. This is vital, since many bulletin boards and other remote systems also assign special meanings to certain control codes—especially to control-C.

Function 6 is unusual as PC-DOS service calls go in that it combines the status request, output request, and input request capabilities into a single format. It is derived from the raw console I/O function of CP/M, which was added to version 2 of that operating system to keep people from making direct calls on the CP/M BIOS. Because of this heritage, it is a little more tricky to use than the normal PC-DOS display and keyboard I/O calls.

The biggest problem to handle is that when you call function 6 for a status request, you also get back the character itself, if one is ready for input—even if you aren't ready to process it yet. Our PC_STAT routine copes with this problem by storing the character into a variable named IN_CHAR, where it can be picked up later by the "real" input subroutine, named PC_IN. To put it another way, the main TALK program regards PC_IN as the source of characters, but PC_STAT contains the true input interface to PC-DOS.

Read this code carefully. It's brief, but it exemplifies several techniques that you'll need to use again and again. Also look at the detailed description of function 6 on page D-19 of the PC-DOS 2.0 manual.

The CLEAR and HOME subroutines may be found in lines 219 through 245. They call the ROM BIOS's video driver to initialize the screen and set the cursor position. Refer to the October installment of this column for a detailed explanation of these functions.

Finally, to finish up the program, the SEGMENT and ENDS statements on lines 250 and 271 define a Data Segment named DSEG, and lines 274 and 280 delimit a similar Stack Segment named STACK. The former holds constants and variables used by the program and addressed via the Data Segment Register (DS), and the latter is a scratch area addressed with the Stack Segment Register (SS).

Readers' comments about the programs published here are very helpful. Please feel free to write in and tell us how we can make this section of the magazine more useful to you. Address your comments to Right To Assemble, Softalk/IBM, Box 60, North Hollywood, CA 91603. ▲

Bits	7 6 5	4 3	2	1 0
	baud rate	parity	stop bits	word length
	000 = 110 baud	X0 = none	0 = 1 bit	10 = 7 bits
	001 = 150 baud	01 = odd	1 = 2 bits	11 = 8 bits
	010 = 300 baud	11 = even		
	011 = 600 baud			
	100 = 1200 baud			
	101 = 2400 baud			
	110 = 4800 baud			
	111 = 9600 baud			

Table 2: Initialization byte for serial port.

AH = port status		AL = modem status	
Bit	Significance	Bit	Significance
7	Time out	7	Received line signal detect
6	Trans shift register empty	6	Ring indicator
5	Trans hold register empty	5	Data set ready
4	Break detect	4	Clear to send
3	Framing error	3	Delta rcv line signal detect
2	Parity error	2	Trailing edge ring indicator
1	Overrun error	1	Delta data set ready
0	Data ready	0	Delta clear to send

Table 3: Explanation of Serial Port driver status word

```
1                                       name    talk
2                                       page    55,132
3                                       .lfcond                 ;list false conditionals too
4                                       title   'TALK--dumb terminal emulator'
5                               ;
6                               ; TALK--a dump terminal emulator for the
7                               ; IBM PC, to illustrate use of the ROM BIOS
8                               ; asynchronous communications card support.
9                               ;
10                              ; Copyright (c) 1983 Ray Duncan
11                              ; May be freely reproduced for noncommercial use.
12                              ;
13      = 000D                  cr      equ     0dh     ;ASCII carriage return
14      = 000A                  lf      equu    0ah     ;ASCII line feed
15      = 001B                  esc     equ     1bh     ;ASCII escape code
16                              ;
17      = 0000                  echo    equ     0       ;leave this zero to run
18                                                      ;communications full-duplex,
19                                                      ;change to -1 if half-duplex
20                              ;
21      = 0000                  comm_port equ   0       ;set to 0 or 1 depending
22                                                      ;on which comm port is
23                                                      ;hooked to your modem
24                              ;
25                              ;
26      0000                    cseg    segment para public 'CODE'
27                              ;
28                                      assume  cs:cseg,ds:dseg,ss:stack
29                              ;
30      0000                    talk    proc    far             ;entry point from PC-DOS
31                                                              ;
32      0000  1E                        push    ds              ;save DS:0000 on stack
33      0001  33 C0                     xor     ax,ax           ;for final exit to PC-DOS.
34      0003  50                        push    ax
35                                                              ;make data area addressable
36      0004  B8 --- R                  mov     ax,seg dseg
37      0007  8E D8                     mov     ds,ax
38
39                                                              ;make sure the modem is on-line
40      0009  E8 0062 R                 call    com_stat        ;by checking the "Data Set
41                                                              ; Ready" bit in the status word.
42      000C  A8 20                     test    al,20h
43      000E  75 06                     jnz     talk1           ;if bit is on, ok to proceed.
44                                                              ;
45                                                              ;bit is not on, print warning
46                                                              ;message and exit.
47      0010  BA 0002 R                 mov     dx,offset msg1
48      0013  EB 48 90                  jmp     talk6
49                                                              ;
50      0016                    talk1:                          ;initialize the display to
51                                                              ;reverse video, so the user
52                                                              ;knows he's talking to the modem.
53                                                              ;
54      0016  B4 0F                     mov     ah,15           ;first use "get mode" function
55                                                              ;of the ROM BIOS video driver to
56      0018  CD 10                     int     10h             ;find the number of columns on
57      001A  FE CC                     dec     ah              ;the display, save it for use
58                                                              ;by the screen clear routine.
59      001C  88 26 0001 R              mov     columns,ah
60      0020  3C 07                     cmp     al,7            ;make sure display is text mode.
61      0022  74 0A                     je      talk2           ;mode 7 ok, proceed
62      0024  3C 03                     cmp     al,3
63      0026  76 06                     jbe     talk2           ;modes 0-3 ok,proceed
64      0028  BA 0018 R                 mov     dx,offset msg2
65      002B  EB 30 90                  jmp     talk6           ;print error message and exit
66                                                              ;
67      002E                    talk2:
68      002E  B7 70                     mov     bh,70h          ;now clear screen and set to
69      0030  E8 00B8 R                 call    clear           ;reverse video attribute 70h.
70                                                              ;also put the cursor in the
71      0033  E8 00C7 R                 call    home            ;upper left corner of screen.
72                                                              ;
73                                                              ;*****************************
74                                                              ;this is the main loop of
75                                                              ;the communications program.
76                                                              ;*****************************
77      0036  E8 008B R         talk3:  call    pc_stat         ;check character waiting
78                                                              ;from the IBM PC keyboard
79      0039  74 0A                     jz      talk4           ;no
80      003B  E8 009E R                 call    pc_in           ;read char. from PC keyboard
81      003E  3C 1B                     cmp     al,esc          ;is it the ESCape key?
82      0040  74 10                     jz      talk5           ;yes, exit the terminal emulator
83
84                                                              ;if running half-duplex, echo
85                                                              ;the character to the PC display
86                                      if      echo
87                                      push    ax              ;save copy of the character
88                                      call    pc_out          ;send it to the PC display
89                                      pop     ax              ;now restore the character
90                                      endif
91
92      0042  E8 0083 R                 call    com_out         ;write char. to the comm port
93                                                              ;
94      0045  E8 0062 R         talk4:  call    com_stat        ;check if character waiting
95                                                              ;from the comm port
96      0048  74 EC                     jz      talk3           ;no, loop
97      004A  E8 007B R                 call    com_in          ;read char. from comm port
98      004D  E8 00B1 R                 call    pc_out          ;write it to the PC display
99                                                              ;
100                                                             ;now do it all again
```

```
0050  EB E4                         jmp     talk3
                                    ;
0052                        talk5:                  ;ESC key detected, prepare
                                                    ;to exit the terminal emulator.
                                                    ;
                                                    ;first set the display back
                                                    ;to normal video, so the user
                                                    ;will know he's talking to
                                                    ;the PC and not the modem.
0052  B7 07                   mov     bh,07h        ;7 is the "attribute" for
0054  E8 00B8 R                call    clear         ;normal video display.
0057  E8 00C7 R                call    home          ;also put cursor in upper
                                                    ;left hand corner of screen.
                                                    ;
                                                    ;print farewell message
005A  BA 0037 R                mov     dx,offset msg3
005D  B4 09                 talk6:  mov     ah,9          ;use PC-DOS function 9 to
005F  CD 21                     int     21h           ;print the string whose address
                                                      ;is in register DX.
0061  CB                        ret                   ;now return to PC-DOS.
                                                      ;
0062                        talk    endp
                            ;
                                                    ;this routine reads status
                                                    ;from the COM port, returns
                                                    ;Z=false if character ready
                                                    ;Z=true if nothing waiting
                                                    ;AH=line status,AL=modem status
                                                    ;register DX destroyed.
0062                        com_stat proc   near
0062  BA 0000                  mov     dx,comm_port
0065  B4 03                    mov     ah,3          ;use ROM BIOS driver's function
0067  CD 14                    int     14h           ;3 to get status, also
0069  F6 C4 9E                 test    ah,09Eh       ;check comm port error flags
                                                    ;for timeout,break,framing error.
006C  75 04                     jnz     com_err       ;error was detected, beep.
                                ;
006E                        com_stat1:              ;test the data ready bit,
006E  F6 C4 01                  test    ah,1          ;returning Z flag=false if
0071  C3                        ret                   ;character waiting.
                                ;
0072  50                    com_err:   push    ax            ;communications error detected
0073  B0 07                     mov     al,7
0075  E8 00B1 R                call    pc_out        ;send a bell code to the PC
0078  58                        pop     ax            ;then go return comm status
0079  EB F3                     jmp     com_stat1
                                ;
007B                        com_stat endp
                            ;
                                                    ;read a character from the
                                                    ;COM port, return it in AL.
                                                    ;register DX destroyed.
007B                        com_in  proc    near
007B  BA 0000                   mov     dx,comm_port
007E  B4 02                     mov     ah,2          ;use ROM BIOS driver's
0080  CD 14                     int     14h           ;function 2 to get char.
0082  C3                        ret
0083                        com_in  endp
                            ;
                                                    ;write the character in AL
                                                    ;to the COM port.
                                                    ;register DX destroyed.
0083                        com_out proc    near
0083  BA 0000                  mov     dx,comm_port
0086  B4 01                    mov     ah,1          ;use ROM BIOS driver's
0088  CD 14                    int     14h           ;function 1 to send char.
008A  C3                        ret
008B                        com_out endp
                            ;
                                                    ;read status for the IBM
                                                    ;PC's keyboard, returns
                                                    ;Z=false if character ready
                                                    ;Z=true if nothing waiting.
                                                    ;register DX destroyed.
008B                        pc_stat proc    near
                                                    ;if a character is already
                                                    ;waiting,just return status
008B  A0 0000 R                 mov     al,in_char
008E  0A C0                     or      al,al
0090  75 0B                     jnz     pc_stat1
0092  B4 06                     mov     ah,6          ;otherwise call PC-DOS to
0094  B2 FF                     mov     dl,0FFh       ;determine status
0096  CD 21                     int     21h
0098  74 03                     jz      pc_stat1      ;jump,nothing ready
                                                      ;got a char, save it for
                                                      ;"pc_in" routine.
009A  A2 0000 R                 mov     in_char,al
009D                        pc_stat1:               ;return to caller with
009D  C3                        ret                   ;Z flag set appropriately
009E                        pc_stat endp
                            ;
                                                    ;read a character from the
                                                    ;IBM PC's keyboard, return
                                                    ;it in AL.  DX may be destroyed.
009E                        pc_in   proc    near
009E  A0 0000 R                 mov     al,in_char
00A1  0A C0                     or      al,al         ;any character waiting?
00A3  75 05                     jnz     pc_in1        ;yes,return it to caller
00A5  E8 008B R                 call    pc_stat       ;try and read a character
00A8  EB F4                     jmp     pc_in
00AA  32 E4                 pc_in1: xor     ah,ah         ;clear the character
                                                      ;waiting flag
00AC  88 26 0000 R              mov     in_char,ah
00B0  C3                        ret                   ;exit with AL=char
                                ;
00B1                        pc_in   endp
                            ;
                                                    ;write the character in AL
                                                    ;to the PC's display.
                                                    ;register DX destroyed.
00B1                        pc_out  proc    near
00B1  8A D0                     mov     dl,al         ;we use PC-DOS function 6 to
00B3  B4 06                     mov     ah,6          ;send the character, it ignores
00B5  CD 21                     int     21h           ;control characters so they
00B7  C3                        ret                   ;can be passed on to the
00B8                        pc_out  endp              ;remote system.
                            ;
00B8                        clear   proc    near    ;clear the display and set
                                                    ;it to the attribute in BH.
                                                    ;registers AX, CX, DX destroyed.
00B8  8A 16 0001 R              mov     dl,columns
00BC  B6 18                     mov     dh,24         ;DL,DH=X,Y of lower right
                                                      ;corner of "window".
00BE  B9 0000                   mov     cx,0          ;CL,CH=X,Y of upper left
                                                      ;corner of "window".
00C1  B8 0600                   mov     ax,600h       ;AH=6 for "scroll or initialize
                                                      ;window" function, AL=0 for
                                                      ;number of lines to scroll.
00C4  CD 10                     int     10h           ;call ROM BIOS video driver.
00C6  C3                        ret
00C7                        clear   endp
                            ;
                                                    ;home the cursor, i.e.
                                                    ;put it in the upper left
                                                    ;corner of the screen.
                                                    ;registers AX,BX,DX destroyed.
00C7                        home    proc    near
00C7  BA 0000                   mov     dx,0          ;(DL,DH)=(X,Y) for new
                                                      ;cursor position, both are 0.
00CA  B7 00                     mov     bh,0          ;BH=video page
00CC  B4 02                     mov     ah,2          ;function 2=set cursor
00CE  CD 10                     int     10h           ;call ROM BIOS video driver.
00D0  C3                        ret
00D1                        home    endp
                            ;
00D1                        cseg    ends
                            ;
                            ;
0000                        dseg    segment para 'DATA'
                                    ;
0000  00                    in_char db      0             ;PC keyboard input char.
                                    ;
0001  00                    columns db      0             ;highest numbered column in
                                                          ;current display mode (39 or 79)
                                    ;
0002  0D 0A 43 68 65 63     msg1    db      cr,lf,'Check your modem.'
      6B 20 79 6F 75 72
      20 6D 6F 64 65 6D
      2E
0015  0D 0A 24                      db      cr,lf,'$'
0018  0D 0A 44 69 73 70     msg2    db      cr,lf,'Display must be text mode.'
      6C 61 79 20 6D 75
      73 74 20 62 65 20
      74 65 78 74 20 6D
      6F 64 65 2E
0034  0D 0A 24                      db      cr,lf,'$'
0037  0D 0A 0A 47 6F 6F     msg3    db      cr,lf,lf,'Goodbye.'
      64 62 79 65 2E
0042  0D 0A 24                      db      cr,lf,'$'
0045                        dseg    ends
                            ;
                            ;
0000                        stack   segment para stack 'STACK'
                                                          ;allow 64 bytes in this case
0000  40[                           db      64 dup (?)
        ??
      ]
0040                        stack   ends
                            ;
                                    end     talk
```

Segments and groups:

Name	Size	align	combine	class
CSEG	00D1	PARA	PUBLIC	'CODE'
DSEG	0045	PARA	NONE	'DATA'
STACK	0040	PARA	STACK	'STACK'

Symbols:

Name	Type	Value	Attr	
CLEAR	N PROC	00B8	CSEG	Length =000F
COLUMNS	L BYTE	0001	DSEG	
COMM_PORT	Number	0000		
COM_ERR	L NEAR	0072	CSEG	
COM_IN	N PROC	007B	CSEG	Length =0008
COM_OUT	N PROC	0083	CSEG	Length =0008
COM_STAT	N PROC	0062	CSEG	Length =0019
COM_STAT1	L NEAR	006E	CSEG	
CR	Number	000D		
ECHO	Number	0000		
ESC	Number	001B		
HOME	N PROC	00C7	CSEG	Length =000A
IN_CHAR	L BYTE	0000	DSEG	
LF	Number	000A		
MSG1	L BYTE	0002	DSEG	
MSG2	L BYTE	0018	DSEG	
MSG3	L BYTE	0037	DSEG	
PC_IN	N PROC	009E	CSEG	Length =0013
PC_IN1	L NEAR	00AA	CSEG	
PC_OUT	N PROC	00B1	CSEG	Length =0007
PC_STAT	N PROC	008B	CSEG	Length =0013
PC_STAT1	L NEAR	009D	CSEG	
TALK	F PROC	0000	CSEG	Length =0062
TALK1	L NEAR	0016	CSEG	
TALK2	L NEAR	002E	CSEG	
TALK3	L NEAR	0036	CSEG	
TALK4	L NEAR	0045	CSEG	
TALK5	L NEAR	0052	CSEG	
TALK6	L NEAR	005D	CSEG	

Warning Errors	Severe Errors
0	0

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Software sales in the month of October were less than exciting, but a couple of curious developments seem to merit attention.

First is the spreadsheet market, where the old standbys seem to be making a comeback; and second is the word processing market, where *WordStar* stubbornly refuses to yield ground to newer programs.

Among the pundits, there's a real question as to who is buying those other spreadsheet products. Lotus's *1-2-3* is so dominant, it doesn't seem as though there's room for other software. *1-2-3* is so strong, its market share is larger than that of all American car manufacturers combined. *1-2-3* is so dominant, it has a larger market share than Standard Oil before it was broken up. *1-2-3* has a bigger market share of spreadsheets than IBM has of mainframes.

The only example of a larger enterprise than *1-2-3* that comes to mind is Ma Bell, and she'll diminish in size next month to become a smaller factor in her markets than *1-2-3* is in its.

Nevertheless, there's still life in the rest of the spreadsheet products. *VisiCalc* continues to show strength, and during October regained the runnerup spot in the genre from *Multiplan*. Microsoft's entry remains viable also.

But the big surprise was the resurgence of *SuperCalc2*. The upgrade of *SuperCalc* had looked to be moribund, but October told a different story. Sales of Sorcim's product were not just upgrades, but new adherents, implying new strength for the old CP/M bellwether.

None of the contenders appears ready for a serious run at *1-2-3*, but their persistence is astonishing experts everywhere.

WordStar took back its lead in the word processing derby as *WordPerfect* dropped to fourth in the genre and twelfth overall. But MicroPro's flagship product is clearly under siege.

MultiMate, the Wang word processing lookalike, continues to stalk *WordStar*, moving into fourth position among all software, even though it lost a little ground relative to *WordStar*. *MultiMate*'s progression through the chart has been consistent, almost leaving the impression that accession to the top spot is inevitable.

But there are other products hoping to play havoc with that possibility. Software Publishing Corporation's *PFS:Write* continues as a strong contender after a promising debut fueled by an imaginative marketing introduction. *PFS:Write* also lost ground relative to *WordStar* in October, but its continued presence in the top ten indicates acceptance by a multitude of pc owners.

WordPerfect, which last month temporarily dethroned *WordStar* as top dog among word processors, suffered some from shortages on dealers' shelves in October. Lack of dealer inventory will hurt any product, but it is particularly severe for products like *WordPerfect* that lack the wider distribution of other top-selling products. Nevertheless, it managed a respectable showing that portends that it's in the market for a long run.

Three other word processors made the Top Thirty and two others hovered just off the list. *Volkswriter* continues selling well although *MultiMate* has grabbed some of its share of the software-exclusively retail market, where *Volkswriter* was once the dominant pc word processor.

Easy Writer 1.1 and *VisiWord* popped in on the bottom of the Top Thirty. *Easy Writer II* and *WordPlus-PC* were just outside the list.

Showing signs of early strength was *Word*, from Microsoft, available in November and doing a brisk business in some areas. This release would seem to be the last event defining the word

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processing marketplace. Now the jockeying for long-term position and market share should commence in earnest.

Three programs appear to have no major competition in their respective genres. That seems an almost incredible situation, in that the large number of pc owners would appear too tempting a market to leave to just one program. Nevertheless, *dBase II*, *Crosstalk*, and *PFS:File* seem to have clear sailing.

Ashton-Tate's *dBase II* has swept the database management field. Several databases are maintaining a fair level of sales without making any serious inroads in market share.

PFS:File seems to be dominating the filing program share of the market with ease, although there are far fewer contenders in the field. *VisiDex* seems to be running a distant second.

Crosstalk has apparently put IBM's *Asynchronous Communications Support 2.0* package in second place for good. *Data Capture-pc* and *Transend* are far behind.

The overwhelming business orientation of the pc can be deduced from the weakening sales of *Home Accountant Plus*, which earlier was one of the leading software sellers. Inasmuch as no home finance package has come forth with a serious challenge to *Home Accountant Plus*, its relative weakness must be attributed more to the business orientation of the computer than to diminishing popularity or strengthened competition.

IBM-franchised retail stores representing approximately 4.17 percent of all sales of IBM and IBM-related products volunteered to participate in the poll.

Respondents were contacted early in November to ascertain their sales for the month of October.

The only criterion for inclusion on the list was the number of units sold; such other criteria as quality of product, profitability to the computer store, and personal preference of the individual respondents were not considered.

Respondents in November respresented every geographical area of the continental United States.

Results of the responses were tabulated using a formula that resulted in the index number to the left of the program name in the Top Thirty listing. The index number is an arbitrary measure of relative strength of the programs listed. Index numbers are correlative only to the month in which they are printed; readers cannot assume that an index rating of 50 in one month represents equivalent sales to an index number of 50 in another month.

Probability of statistical error is plus or minus 5.08 percent, which translates roughly into the theoretical possibility of a change of 5.41 points, plus or minus, in any index number.

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the top thirty

This Month	Last Month	Index	
1.	1.	366.84	**1-2-3**, Mitch Kapor and Jonathan Sachs; Lotus Development
2.	6.	99.79	**WordStar**; MicroPro
3.	4.	93.13	**dBase II**, Wayne Ratliff; Ashton-Tate
4.	8.	82.68	**MultiMate**; Softword Systems
5.	10.	68.42	**Crosstalk**; Microstuf
6.	2.	60.82	**PFS:File**, John Page and D.D. Roberts; Software Publishing Corporation
7.	12.	50.37	**VisiCalc**, Software Arts/Dan Bricklin and Robert Frankston; VisiCorp, IBM
8.	6.	37.06	**Multiplan**, Microsoft; IBM
	8.	37.06	**PFS:Write**, Sam Edwards, Brad Crain, and Ed Mitchell; Software Publishing Corporation
10.	3.	36.11	**Microsoft Flight Simulator**, Bruce Artwick; Microsoft
11.	15.	34.21	**Asynchronous Communications Support 2.0**; IBM
12.	5.	30.41	**WordPerfect**, Alan Ashton and Bruce Bastian; Satellite Software International
	13.	30.41	**Norton Utilities**, Peter Norton; Peter Norton Inc.
14.	30.	22.80	**SuperCalc2**; Sorcim
	11.	22.80	**Basic Compiler**, Microsoft; IBM
16.	16.	19.95	**Macro Assembler**, Microsoft; IBM
17.	29.	19.00	**PC Tutor**, Lora Meise and Rick Lane; Comprehensive Software Support
	—	19.00	**General Ledger**, Peachtree; IBM
19.	28.	18.05	**Cdex Training for the IBM PC**, Rohit Patel; Cdex Corporation
20.	21.	17.10	**Home Accountant Plus**, Mike Farmer, Bob Schoenburg, Larry Grodin, and Steve Pollack; Continental Software
21.	21.	16.15	**The Instructor**, Jo-L Hendrickson; Individual Software
22.	19.	15.20	**Volkswriter**, Camilo Wilson; Lifetree
23.	13.	14.25	**PFS:Report**, John Page; Software Publishing Corporation
24.	24.	13.30	**MasterType**, Bruce Zweig; Lightning Software
25.	26.	12.35	**ProKey**, David Rose; RoseSoft
26.	19.	11.40	**Typing Tutor**, Michael Sierchio (Dick Ainsworth and Al Baker); IBM (Microsoft)
	—	11.40	**PFS:Graph**, Bessie Chin and Stephen Hill; Software Publishing Corporation
28.	—	10.45	**Easy Writer 1.1**, John Draper; IBM (Information Unlimited Software)
	—	10.45	**VisiWord**; VisiCorp
	—	10.45	**Zork I**, Infocom

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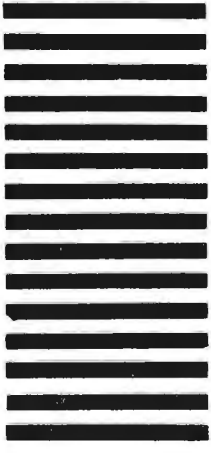

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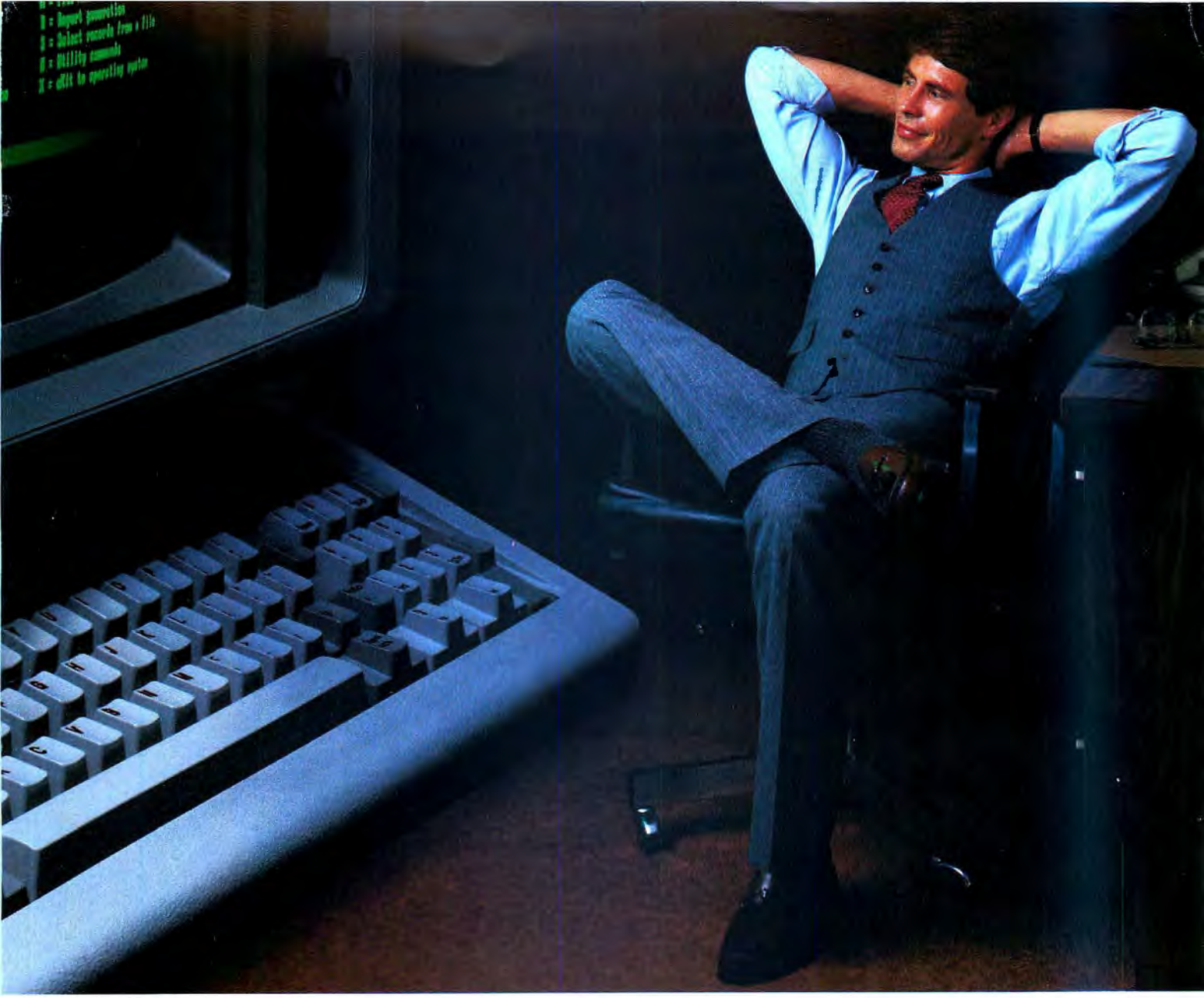

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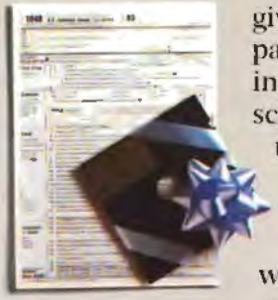

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